The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Brunner Mond Developments

MR. ROSCOE BRUNNER'S statement at the annual meeting of Brunner, Mond and Co. gives a very satisfactory picture of the position of this great chemical organisation. At a time when most concerns are well content if they are not actually going back, there is nothing here but indications of progress and extension. While the number of associated concerns is steadily increasing they still represent a group of closely homogeneous interests, all under unified scientific management, and all closely related and even mutually helpful. It is all orderly organic growth, and the very opposite of that speculative "jobbing" which buys up and jumbles all sorts of miscellaneous companies together under one flag, and is often unable to supply the specialised management which such diverse businesses require. One of the strongest points in the Brunner-Mond organisation is the close relationship of all its sections and the direct expert control which the central management is able to retain over them. This means that every new development will be as competently directed as the original enterprise, and that unity is not to be sacrificed in the process of expansion.

Among the year's developments is a considerable expenditure on boilers at Winnington, which has greatly increased the efficiency of the installation, and on the caustic plant at Winnington and the soda ash plant at Lostock, which has increased the output of both plants. Of particular interest is Mr. Roscoe Brunner's reference to the new ammonia soda works at Wallerscote, about which several inquiries have recently been made. These are nearing completion and will very soon reach the producing stage. They embody considerable improvement on previous practice, and the cost of manufacture is confidently estimated to be lower than those of any of the company's other works. "In fact," Mr. Brunner states, "we believe their cost will be the lowest of any works manufacturing soda in the world"—a claim which, high as it is, is still quite deliberate.

Mr. Brunner's review of the synthetic ammonia developments at Billingham is of great national as well as scientific interest, and more than justifies our comments on the painfully ill-informed criticism which has proceeded from a few Labour members in Parliament. The thirty-ton plant (which the company had already decided to increase to fifty tons) is running smoothly and already showing profits. With the aid of a Trade Facilities guarantee of £2,000,000 and further expenditure by the company, the output is to be increased to 200 tons of ammonia per day. As one ton of ammonia equals 3·8 tons of ammonium sulphate, the total production will be 760 tons of sulphate a day. Instead of being wholly converted into sulphate, the ammonia will be converted into various salts such as the market requires. So well satisfied are the company's experts that they have come to the conclusion that no alternative process, whether Claude, Häusser, or Casale, offers any advantages over the Brunner-Mond process, developed on the basis of the original Haber process. This shows how sound the lines were on which experiment proceeded. The more, in fact, one learns about the Billingham enterprise the more impressive its success becomes from both the chemical and the engineering points of view.

These extensions, notable as they are, by no means exhaust the company's present programme. As the result of the reconstruction of the Magadi Soda Co., the concern has already ceased to make losses, and the great lake is to be developed to its utmost commercial possibilities. It is considered impracticable, however, to bring Magadi ash to this country, and markets must be found where its geographical position gives it an advantage. One cannot mention the natural supplies of soda at Magadi Lake without recalling more recent suggestions respecting the exploitation of the Dead Sea. More than two years ago, in THE CHEMICAL AGE, Dr. Percy Spielmann described the possibilities of developing chemical industries (including the recovery of salt from the Dead Sea) in Palestine, and quite recently Sir Alfred Mond has referred to the great natural resources of

the country. The Crown Agents for the Colonies are now prepared to receive tenders on behalf of the Palestine Government for the exploitation of the mineral resources of the Dead Sea. The scheme is of such dimensions that only a concern with quite unusual scientific and technical resources would think of looking at it. Putting certain facts together, we begin to wonder whether some great organisation like that of Brunner, Mond and Co. may not add to its records yet another signal success in converting the Dead Sea into a rich possession of mineral wealth.

Annual Report of the N.P.L.

THE annual report of the National Physical Laboratory is invariably a monument of industry and contains such a host of precise details relating to so great a variety of subjects that the busy practical man may be excused if he comes to the conclusion that it is difficult to see the wood for the trees. Admittedly, the report as a whole is not everybody's reading, and it is not intended to be ; but if the subjects dealt with are taken selectively there can be few associated with science and technology who would fail to find some point or other directly bearing upon their specific problems. We recollect being told on one occasion by a prominent chemical engineer that he had invariably left the report on his desk waiting for an opportunity for assimilating it—an opportunity which never seemed to come. One day, however, he picked it up and unconsciously turned to the index in which he commenced to mark off those references which interested him. The index, it may be remarked, is a most commendable example of what an index should be, and it was a matter of surprise to our informant to find that he had noted quite a number of pertinent references which would mostly have been overlooked in anything but a close and rather laborious scrutiny of the text. This is a method of attack which can be wholeheartedly recommended to the busy man, and which might do something towards ensuring that the exclusive work which the N.P.L. does is turned to the account which it deserves.

Chemical engineers, for instance, will find a number of problems of everyday interest treated with an admirable balance between theory and practice, while there are many suggestive ideas which are rendered more valuable by the fact that they are the direct result of some carefully contrived experimental investigation. To take but one example, there is the work which has been done in connection with rust prevention materials, and which relates to the use of crude lanoline deposited from various liquids. The latter included petrol, paraffin, boiled linseed oil, benzine and benzene. The general result of the tests with paraffin, petrol, etc., showed that the lighter the liquid the better the deposit obtained upon the metal, whereas boiled oil (surely one of the most popular of dressings) proved to be permeable to water whether mixed with lanoline or used alone. The best result was, in fact, obtained with lanoline mixed with benzene, the latter taking up about 40 per cent. by weight of lanoline and giving a really satisfactory coating upon metals. The tests made upon pieces so coated and exposed to rigorous conditions of air and sea water showed extremely great resistance to the formation of rust.

Acid Concentration with Burner Gases

WHEN suggestions are met with which have for their object the concentration of sulphuric acid by means of the heat of combustion of sulphur one instinctively approaches them with caution, bearing in mind that the primary function of the Glover tower is, and always will be, that of a denitrator and not a concentrator. There is, however, sufficient experience to show that by judicious design and correct proportioning of the various parts constituting the integral unit it is possible to increase the concentration capacity of the Glover tower materially without impairing its ability to discharge efficiently the work of denitration. Limitations are, of course, imposed so far as the degree of concentration is concerned, and if it becomes a question of producing acid of greater strength than about 80 per cent. then other means must be sought. In this country, however, there are many works where the call is for concentrated acid of lower strengths, and where the quantity of rectified acid needed is comparatively small. In such cases the useful rôle of the Glover tower is self-evident, and Messrs. Parrish and Snelling have only lately pointed out (in one of the volumes they have contributed to the *Chemical Engineering Library*) that, if the colour of the acid is not a primary consideration, it pays handsomely to utilise the Glover tower as a concentrator, for to convert chamber acid to 80 per cent. strength by other methods involves an expenditure to-day of anything from 3s. 6d. to 12s. 6d. per ton according to the size and type of the concentrator adopted. If this outlay can be saved by the utilisation of heat which is already available it obviously constitutes an important pecuniary consideration. Again, with hand burners which are properly designed, or with mechanical burners which are fitted with really effective dust eliminating plant, it is possible to produce an almost water-white Glover acid, so that in such cases the difficulty associated with colour is not one which may be said to arise.

Our attention has been attracted to this phase of the concentration process by the description which appears in the current issue of *Chemical and Metallurgical Engineering* of a new system which relies upon the heat of combustion of the sulphur. The new process is known as the Stantial divided Glover tower, and by using the waste heat from the sulphur burners, and with little in the way of additional expenditure on plant, it has been found that 96 per cent. acid can be produced at a saving of from 6s. to 8s. per ton as compared with the cost of manufacture with the usual combination of chamber plant and detached concentrating system. It is not possible to give a detailed description of the process here, but it may be mentioned that hot gases from the sulphur combustion chamber pass direct into the base of the Glover tower partitioned vertically into two shafts which are operated in parallel. One of these shafts produces a strong acid of from 84 to 96 per cent., while the other shaft yields a weaker denitrated acid varying between 75 and 78 per cent., which is ultimately distributed to the Gay-Lussac tower. Two of the Stantial plants have been in successful operation at the works of the Merrimac Chemical Co. of Boston since 1923, and our American contemporary speaks of the inven-

tion as marking an advance in technology which deserves a front rank place as an accomplishment of chemical engineering in the sulphuric acid industry. The process is certainly one of very considerable interest, of which chemical engineers in this country will be eager to learn more.

Too Many German Chemists

CONSIDERABLE interest has been aroused in German industrial and educational circles by the recent issue of a "warning" from the German Chemical Society, directing attention to the very large number of chemical students in the universities, and the increasing difficulty in finding suitable employment for young chemists. It is pointed out that the number of chemical students passing out of the universities during the last ten years is as follow :—

	Chemical students of German nationality in winter term.	German chemists graduating from universities.
1913–14 ..	2,729	362
1919–20 ..	6,373	482
1920–21 ..	7,257	449
1921–22 ..	7,005	544
1922–23 ..	7,325	776
1923–24 ..	6,851	941

It is expected that the number graduating during the current year will show a further increase up to at least 1,100. The total number entering industry as applicants for positions as chemists during the five years ended 1923–24 was 3,192. This does not include the not inconsiderable number who do not complete their chemical training, but content themselves with the standard imposed by the trade union or guild examination. The total number of German chemists in employment at the end of the war was estimated at 10,000, so that if an annual average increase of 330 be assumed, after allowing for deaths and incapacitation, the total number at present would be doubled in ten years. It is clear, however, that German industry is quite unable to absorb these increasing numbers.

The extent of unemployment among German chemists to-day may be roughly gauged from the fact that for every opening advertised there are 150 to 200 applicants, the majority of whom are presumed to be unemployed. There are hundreds of young chemists in Germany who have been seeking suitable posts for years. Moreover, the frequently heard assertion that German chemists can easily find very good posts abroad is unfounded. In the first place, such openings are closed to German chemists in former enemy countries for political and sentimental reasons ; and in the second place most foreign countries have already more chemists than they know what to do with. In order that the economic position of the young German chemist may be to some extent assured, it is considered necessary to reduce the number of university chemical students below the pre-war level, *i.e.*, to about one-third of the present number. Only then will it be possible for this smaller number to find positions at reasonable salaries. This state of affairs has been brought strongly before the university authorities, with the urgent request that all students presenting themselves for chemical training should be thoroughly advised as to their ultimate prospects in German industry, and that only those with a particularly strong bent and natural aptitude for chemical study should be encouraged to proceed.

The Faraday Benzene Centenary

THE Royal Institution and the bodies associated with it for the occasion are hoping that the arrangements now being made to celebrate the centenary of the discovery of benzene by Faraday in the Royal Institution Laboratory, communicated to the Royal Society of London on June 16, 1825, will worthily commemorate Faraday's achievement. It is the kind of public-spirited effort that deserves to be well supported, and one with which all chemists claiming any pride in the triumphs of their own science will wish to be associated. A reception of delegates by the Duke of Northumberland (president) will take place in the theatre of the Royal Institution on Tuesday, June 16, at 11 a.m., and will be followed by the delivery of short appreciations of Faraday's discovery by British and foreign delegates. In the evening the Duke of Northumberland will preside over a banquet in the Hall of the Goldsmiths Company, at which a distinguished gathering is expected. A few places, we understand, are still available, for which early application is desirable. On the previous Friday, Sir William Pope will deliver a memorial lecture on "Faraday as a chemist," which, one may confidently predict, will serve as an admirable introduction to the later celebrations. Tickets for the banquet (two guineas), as well as for the reception and the lecture, may be obtained from the Secretary, Royal Institution, 21, Albemarle Street, London, W.1.

Points from Our News Pages

An Important interview with Sir Max Muspratt includes statements on the subjects of nitrogen fixation and the possibility on entering the dye industry as regards the United Alkali Co., Ltd. (p. 520).

"Prodorite"—a new acid-resisting material is the subject of an article by Mr. J. H. West (p. 522).

Mr. Roscoe Brunner's important statement at the annual meeting of Brunner, Mond and Co., Ltd. (p. 528).

The death is announced of Messrs. G. Russell, John H. Dickinson, E. G. Proulx, H. S. Rowe, T. S. Kirkwood, and Drs. David T. Day and G. L. Spencer (p.534). Sir William F. Barrett, F.R.S. (p. 533).

The London Market has been quiet with no special feature (p. 539).

The Scottish Report shows slight improvement in heavy chemicals (p. 542).

The Calendar

1925 June		
4	Chemical Society : Papers by W. A. Wightman, T. A. Henry, H. Paget, J. A. Goodson. 8 p.m.	Burlington House, Piccadilly, London.
12	Royal Institution : "Faraday as a Chemist." Sir William Pope	21, Albemarle Street, Piccadilly, London.
16	Royal Institution, Chemical Society, Society of Chemical Industry and the Association of British Chemical Manufacturers : Faraday Benzene Centenary. Reception of Delegates. 11 a.m.	Royal Institution, Albemarle St., London.
	Banquet. 7 p.m.	Hall of the Goldsmiths' Company, Foster Lane, Cheapside, London.
17	Royal Microscopical Society : Annual Exhibition of Microscopic Pond Life. 7.30 p.m.	20, Hanover Square, London, W.1.

Some World Aspects of Chemical Industry

A Chat with Sir Max Muspratt

In the following article the Chairman of the United Alkali Co. discusses some general aspects of chemical industry at home, in the Dominions, and in the United States, and makes an important announcement respecting his own company's relation to the dyestuffs and nitrogen fixation industries in this country.

SIR MAX MUSPRATT, who has been in Spain on business for about three weeks, has just returned home. This year, owing to his absence, he missed the opening of Wembley, but he has taken an early opportunity of visiting the Chemical Exhibition, of which he and his company were among the first supporters, and it was the spectacle of the various chemical exhibits that suggested some remarks on the outlook of British chemistry.

An Imperial Outlook

"Whatever may be the volume of actual business done at the Exhibition," he said, "it seems to me a duty, in a great exhibition of the resources of our Empire, to see that scientific and especially industrial chemistry is worthily represented. We have among the thousands of visitors not only our own Colonial people but representatives of many other nations. It is important that they should know that chemically we are a manufacturing nation and that their demands can be supplied out of British resources. Of course, in the heavy chemical industry, we have long held the supremacy, and have no intention of surrendering it. We ourselves in the United Alkali Co. are always following up developments in all parts of the world, and have members of our staff constantly travelling for the purpose of studying world economic and trade conditions. But there are other branches of chemical production for which this country has not been so famous in the past, and the Exhibition will show our foreign and Colonial visitors how we are advancing in such matters as fine chemicals and dyestuffs, for which we were formerly content to rely on other nations."

A FAMILY GROUP ON BOARD SHIP, SHOWING SIR MAX AND LADY MUSPRATT (centre), WITH THEIR SON AND DAUGHTER, MR. RUDOLPH MUSPRATT AND MISS VANDA MUSPRATT

Impressions of Canada

"I am, of course," Sir Max continued, when reminded of his last year's visit to Canada and the United States, "a profound believer in the future of our Dominions, with their wonderful natural resources and their fine types of colonists. The closer their connection with the home country, the better it is bound to be for both. As I told them in Canada last year, I believe that Canada, with the great extent and variety of its natural resources, is bound ultimately to become largely self-sufficing. I could, of course, not offer expert advice to Canadian manufacturers as to how they should compete with their powerful neighbours to the south, but it seemed to me obvious that the onus lies on the leaders of Canadian industry to thrash out their own problems and find ways to become masters of the great markets that properly belong to them.

"We shall continue, I think, to draw more and more of our raw products from Canada, but I do not see how we are to send many more manufactured goods out there, except in specialised lines in which British producers have done well. The same probably applies to all our Dominions. But after all their development is bound to be for the good of the Empire as a whole, and in that development this country, and especially the chemical industry, is bound to play a large part. It means, for example, a great field for British chemists, metallurgists, and chemical engineers, in the development of their natural resources, the provision of plant, etc., and our leaders of industry and finance may also find great opportunity in Colonial fields. We certainly need to keep in sympathetic touch with all our Colonial enterprises. In Canada, for example, the natural resources are enormous. The population is far too small for the country, which offers many fine opportunities for young men of energy and ambition. The food supplies are inexhaustible. The water power, which is now so important a factor in electro-chemical industries, is greater than in the United States, though possibly there may be difficulties in connection with water rights. Of the mineral resources it is impossible to estimate the extent. What is true of Canada is more or less true of all our Dominions, and as chemical science and technology play such a vital part in the development and utilisation of natural resources, the subject of Colonial development is one that should be of constant interest to the chemical industry."

American Methods

"As regards the United States," Sir Max continued, "I am a great admirer of the American people and feel that nothing but good can result from our knowing more of each other as nations, and keeping together on the great ideals and objects respecting which we are united as one race. At the same time, I never admire America to the disparagement of our own country. They have much to teach us as a younger nation; we have something still to teach them. In my opinion we have nothing to fear from the United States. They are in the main pre-occupied with their own affairs, and from 30 to 50 years more will be occupied in developing their own resources. It is impossible really to compare the two countries, because the conditions in America and in England are so very different. The Americans are in some ways wonderfully enterprising. They have developed mass production to a remarkable degree—the motor industry is, perhaps, the best example. It must be remembered that they have an immense population of their own, before they begin to think of finding customers elsewhere. Then they believe thoroughly in comfort and luxury, and like new devices for labour-saving, both in business and in domestic arrangements.

"One hears a great deal about American hustle, but as a matter of fact Americans are great wasters of time, very much inclined to be late, and quite slow in many ways. Our shorter hours and more intensive work are in several respects

more effective. Their tendency is to specialise very much in business and in everything, with the result that their outlook is apt to become narrow and restricted on general matters. They want, for example, to develop a really educated public opinion in politics. They spend very large sums on industrial research, both through State and private enterprise, and are very alert in applying its results commercially. On the other hand, in fundamental chemical research, which lies at the very basis of things, I fancy we compare very favourably with them. Anyhow, I know how profound their respect is for the great English leaders in chemical science and technology. Taking everything into account, I have no fear of displacement in neutral markets, at any rate for some years to come, by the United States, and while we can appreciate many of their distinctive characteristics, I see no reason for doing so at the expense of ourselves."

British Dyestuffs and Nitrogen Industries

Finally, Sir Max Muspratt touched briefly on the possibility of future developments in connection with his own company. Reminded of his recent references to the dyestuffs industry and to the need for increased co-operation, and asked whether this pointed to a more direct participation by the United Alkali Co. in intermediate or actual dyestuff production, Sir Max replied :—

" Several important intermediates are in all essentials of manufacture heavy chemicals, and these should be made by the heavy chemical manufacturers. If the dye-makers are prepared to take these on reasonable terms, the United Alkali Co. has no desire to go into the dye industry, but if it saw serious business going past it, it would be compelled to take a hand itself. I do not believe that this necessity will arise. In addition to the heavy intermediates, there are several specialities which have been worked out in our central laboratory, and where they fit in with our main programme we shall hope to produce these for the dye-makers."

His attention was also directed to the recent visit of Dr. Casale to London and to Dr. Clayton's address, in which the establishment was suggested of alternative plants and processes for the fixation of atmospheric nitrogen. In reply to a question as to whether his company were contemplating entering the nitrogen fixation industry, Sir Max remarked :—

" We have no immediate intention of entering the field of nitrogen fixation, but we do feel it necessary to keep in the closest touch with all developments on these lines, especially with a view to the manufacture of nitric acid from ammonia."

Patents and Trade Marks in the Irish Free State

To the Editor of THE CHEMICAL AGE

SIR,—A Bill, entitled " Industrial and Commercial Property (Protection) Bill, 1925," has recently been introduced in An Dail. It is a very lengthy one, containing, as it does, 184 sections. A brief outline of the Bill, chiefly as it affects British inventors and British trade mark owners, is given below.

Any person who applied for a patent *in Ireland after* December 6, 1921, and before the commencement of the Act, and makes a fresh application in the Irish Free State within six months of the commencement of the Act, is entitled to have the fresh application dated the same as the original application in Ireland. This date will determine priority.

Therefore, inventors who desire protection in the Irish Free State should have their applications made *without delay* with a view to claiming priority when the Act comes into force.

British patents dated *prior* to December 7, 1921, are to have the same force and effect as Irish Free State patents after the commencement of the Act.

British patents dated *after* December 6, 1921, are to be of no force or effect in Saorstat Eireann, but, if they are of earlier date than the commencement of the Act, application may be made within one year of such commencement for Irish Free State patents corresponding with the British in terms and date.

Trade mark owners are advised to apply for registration of their marks in the Irish Free State without delay with a view to guiding the Irish authorities as to the date of priority.—

Yours, etc.,
H. T. P. GEE,
Patent and Trade Mark Agent.

51-52, Chancery Lane, W.C.2.
May 20.

" Pyropruf " Roofing

To the Editor of THE CHEMICAL AGE.

SIR,—As a sequel to the recent " Pyropruf " Roofing fire-test at the L.C.C. Stores Depot, we feel sure you will be interested in the following additional facts :—

Owing to the intense heat generated at our fire-test it was not possible to inspect the buildings until the following morning, when it was found that the fire had been so fierce that bricks had been burned through, all the glass had fused, and the zinc flashing had entirely melted. The fireproofed rafters, together with the roof boarding, had completely disappeared, except the two rafters against the party walls, and these were badly charred. Around the edges of the roof, where support was still available, the " Pyropruf " Roofing still remained intact, thus effectively proving its fire-resisting capacity.

Possibly you noticed the greater intensity and duration of the fire in the " Pyropruf " chamber. We have ascertained that this was in part due to the action of a cinematograph operator, who had a roll of many hundreds of yards of celluloid thrown on the fire to obtain a flame of greater actinic value. This fuel, added to a fire which was already little less than a blast furnace, provided a test which " Pyropruf " withstood in a manner truly marvellous. As you can conceive, however, no known material could withstand for long such a severe test. Small flames finally appeared through the fissure in the unsupported bitumen; that part of the roof fell in and left the remainder of the " Pyropruf " intact.

There seems to have been some disparity of opinion among the spectators as to the actual facts we were demonstrating. To remove any misconception as to our purpose, may we repeat that our intention was to show that " Pyropruf," in addition to its other essential qualities, was a roofing which would not support combustion and was thus immune from exterior fire attack. In other words, it could not cause a fire and would not spread a fire.

The reason we used slate and tile roofs for the adjoining buildings was to prove—first, that in all practical circumstances, even with a burning building on each side, " Pyropruf " could not catch fire from the exterior, and secondly, it would be noted that upon the application of water the slates and tiles soon collapsed, whilst " Pyropruf " was quite unaffected under the same treatment.

We think you will agree, after witnessing the tremendous test given and knowing the additional facts we now give you, that " Pyropruf " is a roofing with truly exceptional qualities and an important economic factor in roof construction. Most emphatically do we claim that it is a first-class roof—a permanent one, on any building, anywhere. As such it forms a valuable contribution to the national effort to construct economical buildings for the masses, in addition to its general value as a roofing for factories, dock warehouses, and in fact for any building where artistic effect is not the first consideration.—Yours, etc.,

For D. ANDERSON AND SON, LTD.,
L. C. LUTYENS,
Managing Director.

London, May 20.

New B.D.C. Colours

Two new colours are announced by the British Dyestuffs Corporation. One is Dispersol Yellow 3G Paste, an addition to the company's range of Cellutyl colours. It is chiefly of interest for its very bright greenish-yellow shade and the fact that it is one of the few non-phototropic yellow colours of this class. An extremely delicate effect is produced by 0·5 per cent. of the paste on Celanese knitted fabric. The other colour is Monolite Red B Paste, an addition to the company's range of insoluble pigment colours. It is of interest to manufacturers of wall papers, surface papers, distempered colours and paints fast to lime and colour. It is somewhat soluble in oil and cannot, therefore, be used as an oil paint if complete insolubility is essential, but where this is not the case it is extensively employed, as, for instance, in paints for agricultural implements, iron fencing, etc. It is also used in artists' paints and certain classes of printing inks. Two samples illustrate its successful use as a paper surfacing colour, and in one we notice the liberal use of China Clay.

A New Acid-Resisting Material

By J. H. West, A.M.Inst.C.E.

The author describes the properties of a new acid-resisting pitch concrete, known by the name of "Prodorite," which appears to be capable of extensive use in chemical and similar works as flooring, lining for pipes and tanks, etc. The material, it is claimed, is completely resistant to all dilute acids, to concentrated HCl, and to nitric and sulphuric acids up to certain strengths.

THE problem of finding suitable materials of reasonable mechanical strength for constructional work and plant to deal with acids, particularly such acids as hydrochloric, acetic, and other organic acids which attack lead, is one of those which are a constant trouble in the chemical industry. The appearance, therefore, of any satisfactory new acid-resisting material is a matter of considerable interest to chemical manufacturers.

"Prodorite"

Some three or four years ago a Swiss company operating a process which involves the use of concentrated hydrochloric acid on a large scale (both in the liquid and gaseous states) were so troubled by the difficulty of finding a suitable material of which to make their apparatus that they determined to work out a new material for this purpose. As a result of very extensive research they hit upon the idea of a concrete using a specially hardened pitch as a binder, together with graded acid-resisting mineral aggregate. After a great deal of experimental work this material—which has been called "Prodorite"—was developed sufficiently to enable them to construct their own plant of it, and it proved to be so satisfactory for the purpose that it was decided to place it on the market. Arrangements were therefore made for the commercial development of "Prodorite" in various countries.

The writer has recently had the opportunity of seeing what has been done in this direction in France, Switzerland, and Germany. In France a plant was erected under the auspices of a leading French firm of ferro-concrete consultants, and the largest firm of chemical manufacturers in France were approached to see of what use this new material could be to them. This company who, among other things, manufacture superphosphates on a large scale, were having a great deal of trouble with the brick flues and chimneys carrying away the highly corrosive gases from their superphosphate dens, and they tried "Prodorite" first of all for a section of one of these flues. This trial section proving satisfactory, they immediately placed an order for a chimney, 90 feet high, constructed entirely of "Prodorite." This has now been in use for about 12 months and a second chimney for the same purpose, about 210 feet high, is approaching completion. Negotiations for two further chimneys are now in progress. A number of other flues have been supplied and also linings for concrete tanks to hold dipping acid in a wire drawing and plating works. A long 12 in. "Prodorite" sewer for carrying away the acid effluent of a chemical factory has also been put in.

In Switzerland, besides the original plant of the inventors, a number of "Prodorite" floors in factories dealing with acids have been put in and these are giving entire satisfaction. Furthermore, a Swiss manufacturer of concrete pipes has carried out extensive tests with "Prodorite" pipes and is about to start their commercial manufacture as soon as supplies of suitable pitch can be arranged for.

Taken up in Germany

In Germany "Prodorite" has been universally hailed by chemical engineers as an extremely valuable new material. Among others, representatives of the following companies have personally investigated "Prodorite":—Badische Anilin and Sodafabrik (a commission under the leadership of Dr. Mohr), Lurgi-Apparatebau-Gesellschaft (a branch of the Metallbank), Chemische Fabriken Griesheim-Elektron, Höchste Farbwerke, Chemische Fabriken Kunheim and Cie, Deutsche Zunholzfabrik A.G., and Rheinische Gummi and Celluloidfabrik. The one question put by all these was how soon commercial orders could be executed.

Two plants for making it are in operation in the Mannheim district, and commercial floorings are already in use and are being put down as rapidly as the orders can be carried out. Experimental work is also being carried on on a very extensive scale on the manufacture of "Prodorite" pipes and tanks by the largest manufacturer in Germany of concrete pipes, slabs and other articles, and it is now only a matter of a short time before these applications of "Prodorite" will be on the market.

As regards this country, a small plant has been erected in the Midlands and a considerable amount of experimental work has been carried out with it sufficient to show that "Prodorite" can be manufactured over here quite as well as on the Continent. No commercial work has yet been undertaken in England, but arrangements are now in progress for starting commercial manufacture right away; in fact, as regards floorings and linings for concrete tanks, these could be undertaken at any time.

Properties of "Prodorite"

In conclusion a brief description of the properties of "Prodorite" will not be amiss. First of all, the pitch used is a special very hard pitch distilled in a particular way and differs from ordinary commercial pitch in the fact that, at the temperature of use, it is an absolutely solid rigid body with none of the plastic semi-fluid qualities of ordinary pitch. "Prodorite" is made by mixing a suitably graded aggregate, in carefully predetermined proportions, with the melted pitch, and the product has all the properties of the best cement concrete, save that it is somewhat more brittle, but as regards tensile and compressive strengths it is fully equal to ordinary concrete. Compressive strengths of 6,000 to 7,000 lbs. per sq. in. can easily be obtained, and tensile tests of 1,000 lbs. per sq. in. and over have been obtained with "Prodorite" cement and mortar briquettes corresponding to neat cement and cement plus sand briquettes.

The material has a smooth, black surface, and can be cast into any form and can be reinforced just like ordinary concrete.

The essential difference between "Prodorite" and any of the bitumastic materials which have been used hitherto for lining pipes and chemical vessels lies in the fact that, whereas these bitumastic materials are always more or less plastic or semi-fluid, "Prodorite" is a strictly non-plastic material at the temperature of use, which may be fairly high. For instance, a beam of "Prodorite" which is supported at the ends and loaded in the middle to a point just insufficient to cause fracture will remain indefinitely without permanent deflection even if it is maintained throughout at a temperature of 60° or 70° C. As a matter of fact, pitch has been prepared which remains absolutely non-plastic at the temperature of boiling water, and it will probably be possible to make "Prodorite" vessels to stand this temperature; the only difficulty to be overcome being to provide means of taking up the expansion and contraction with change of temperature without the development of cracks.

The Question of Cost

As regards cost, it is a little difficult to give definite figures for special apparatus, since the cost will naturally depend a good deal upon that of the moulds required and the number of similar articles to be made, but "Prodorite" floorings can be laid for about 18s. per sq. yd. and tanks can be supplied for from 6s. to 8s. per sq. ft. of surface according to size and shape.

The material is completely resistant to all dilute acids, to concentrated hydrochloric acid, to nitric acid up to 30 per cent. in the cold, sulphuric acid up to 70 per cent. in the cold and 40 per cent. at 100° It also resists the action of most other chemical reagents. There would, therefore, appear to be a very wide field of application for "Prodorite" in the chemical industry, and it is satisfactory to know that this valuable material will be manufactured in this country, so that we shall not be dependent on importation from abroad.

An East End Hostel for Boys

Two gifts, one of £10,000 from the Carnegie United Kingdom Trust, and another of £4,600 by Sir Ernest Benn, have enabled the council of Toynbee Hall to acquire the freehold and building in Bower Street, Stepney, until recently occupied as one of Dr. Barnardo's Homes. These premises it is proposed to reconstruct so that they may be used (1) as a hostel for ninety working-class boys; (2) as a physical training centre for members of boys' clubs in the neighbourhood; and (3) as a social club for families in adjacent streets.

Chemical Exhibits at the British Empire Exhibition

Further notes are published below on the chemical exhibits at Wembley. The remainder of the exhibits will be noticed in future issues.

Baird and Tatlock (London), Ltd.

THIS firm's stand is fitted by the firm's own workmen, and was made at their works at Walthamstow of the material used by them in fitting up laboratories. The fittings are samples of some of the many laboratory benches and fitments which they supply. The finish is that normally used in laboratories and not specially touched up for exhibition purposes. The same type of benches and finish is in use in the modern laboratory exhibited by the Ministry of Health in the Government Pavilion, which was fitted by Baird and Tatlock. The apparatus shown covers a very wide range from chemistry to psychology, mechanics to bacteriology. The apparatus shown is taken direct from stock and together with the display of fine chemicals is worthy of notice.

The Salt Union, Ltd.

are showing, amongst other items, their famous P.D.V. salt, which is preferred to all others by butter and cheese makers all over the world, who find its great purity (99·83 per cent. sodium chloride) and fineness adds so materially to the flavour and quality of their products.

"Salodine" table salt is also being shown. This is a new product containing iodine. It has been produced at the special request of the medical faculty with a view to improving the general health of the community and particularly attacking the troublesome complaint "goitre."

The taste and appearance of the salt is not altered by the introduction of the iodine—the salt still remaining beautifully white and retaining its free running properties. The enterprise of the Salt Union, Ltd., is beautifully illustrated by miniature models of their works.

The Graesser-Monsanto Chemical Works, Ltd.

of Ruabon, North Wales, whose products have become famous in the chemical world, were among the first manufacturers of phenol, of which, in the early days, a good week's output was about 9 cwt., the crystallising point being 35° C. To-day they are the largest manufacturers of natural phenol in the world, and set a stringent standard of quality shown by the crystallising point of 40/41° C.

One part of the stand is given over to interesting specimens of phenol and cresol derivatives, and a large crystal ball, rising to about 6 ft., is full of ice crystals, which is a form of phenol in most demand. The many by-products can easily be seen in the interesting show-cases. On the right of the stand can be seen specimens of fine chemicals which on account of their extreme purity are in request throughout the Empire.

Some of the famous chocolate makers owe a great deal to vanillin-monsanto, a flavouring agent which has gained a world-wide popularity on account of its uniformity and purity. Here also can be seen saccharin-monsanto, the sweetening agent used extensively in the manufacture of mineral waters. About 550 times stronger than sugar, it has come to be relied upon as the standard. In the same showcase are to be seen the beautiful form and appearance of salicylic acid B.P. and acetyl salicylic acid B.P., which is better known as aspirin.

The Graesser-Monsanto chemical works have just succeeded in creating a new form of aspirin, which can be seen. This requires no granulation; it is chemically identical to any other form of pure aspirin, but differs in shape. It is 100 per cent. aspirin and contains no added ingredient.

The Erasmic Co., Ltd.

of London and Paris, who will long remain in the memory of visitors to the British Empire Exhibition, 1924, as the "Soap Bubble Firm," are again making a most striking exhibit. The soap bubble fountain, with its profuse cascade of millions of bubbles made from "Peerless" erasmic soap, will again occupy a prominent position. The stand, this year, occupies almost the same site as last year, with the addition of a space on the other side and at the back of the bubble fountain; thus this wonderful attraction occupies the centre of the entire exhibit. The colour scheme of the stand has been carried out in mauve with violets, symbolical of the toilet soap "Peerless," the sales for which have considerably increased during the last few months, due, no doubt, to a great number of the public trying this soap for the first time after the last exhibition.

The Erasmic Co. have, during the past year, further added to their laurels by being appointed to The Nizam of Hyderabad, and also purveyors to The Crown Prince of Sweden. The company have held the Royal Appointment as "Fine Soap Makers" to the King as well as to the King of Spain, for some little time. They are also holders of the highest possible awards at all recent exhibitions, the last being the Hors Concours—Rio de Janeiro Centenary Exhibition, 1923.

The most prominent feature in the display is the "Peerless" erasmic soap and erasmic shaving sticks, but many of the more recent productions are shown, including "Kiddy" soap, "Kiddy" powder and cream, three delightfully presented lines in charming containers bearing a nursery rhyme design by the artist, Mabel Lucie Attwell. Trial sizes of these three products are packed in miniature cottages, and these will serve as a dainty souvenir of this great exhibition.

Burroughs Wellcome and Co.

This year's exhibit is on a scale even greater than in 1924. The fine central showcase, crowned by a statue of Mercury, is devoted to "Wellcome" brand chemicals and galenicals. With it is associated a beautiful display of crystals passing from the most to the least symmetrical and arranged in cubic, hexagonal, trigonal, tetragonal, orthorhombic, monoclinic and triclinic groups. Arranged at spacious intervals, eight auxiliary showcases devoted to the special activities of the firm support the main exhibit. All of these are arranged on a definite, scientific basis and some deal exclusively with research.

The demonstration of the stages of manufacture of "Wellcome" brand insulin and of other well-known products requiring special technical skill in production will serve to educate public opinion to the enormous difficulties which British manufacturing chemists have to overcome. The same remark applies to the cases devoted to sera and vaccines, and to other preparations of animal origin.

"Kharsivan," the first British salvarsan; "Moogrol" for the treatment of leprosy; and other examples of the pioneer work of Burroughs Wellcome and Co. are displayed in a manner likely to render them specially interesting.

"Tabloid" photographic products are associated with that part of the exhibit in which the firm demonstrate their flair for producing compact and complete medical equipments to meet any exigency of service or climate. There is shown the smallest medicine case in the world. It measures only $\frac{5}{8}$ in. on its longest side; yet it holds twelve phials, containing 300 doses of perfectly compressed "Tabloid" products, equivalent to 15 pints of fluid medicine.

The display of medical equipments will bring home to all who pay it a visit the unostentatious but very effective part taken by Burroughs Wellcome and Co. in fitting out all the great expeditions since Sir Henry Stanley's journey through Darkest Africa. The actual medicine cases (their exterior showing signs of wear and tear and the interiors bearing eloquent testimony to the calls made upon them) used by many renowned explorers and adventurers provide a most engrossing exhibit.

It seems almost incredible, but is nevertheless true, that one small showcase should contain the actual medical equipments used by Peary at the North Pole, Amundsen at the South Pole, Scott, Shackleton, Stanley in crossing Darkest Africa, the three Mount Everest Expeditions, Sir John Alcock in the first direct transatlantic flight, Maclaren in his attempt to fly round the world, the U.S.A. airmen in the first round-the-world flight, airship R34 in the first transatlantic airship flight, Sir Ross Smith in the first aeroplane flight to Australia and Bleriot in the first cross-Channel flight.

Lastly, the quality of "Tabloid" photographic chemicals in every conceivable variation of climate is demonstrated by the display of actual photographs taken by the expeditionary parties and developed by "Tabloid" chemicals.

The Present Condition of Chemical Shipments

The following review of present conditions governing chemical shipments has been specially prepared for THE CHEMICAL AGE *by our Statistical Department.*

CHEMICAL trade during the twelve months of 1924 may be summed up in brief as having brightened considerably in respect of home sales, but overseas sales have not been altogether good. In some directions such as with alkalis, acids and similar heavy chemicals, British manufacturers have done well, but work with shipments has not improved as much as had been anticipated. In fact, the total shipping statistics for British ports in 1924 reveal an actual decrease of 2,000 in the number of ships dealt with and the handling of a volume of goods lower by 2,000,000 tons than in 1923.

Heavy Shipping Costs

The same periods show that the world tonnage of ships in construction is gradually rising, but that in the case of the United Kingdom the tonnage is 98,000 tons smaller. These factors serve to illustrate the troubles which still beset British shipping, and to these may be attributed much of the difficulty experienced by chemical exporters in regaining pre-war markets. Shipping in this country, with burdensome costs, feels itself unable to offer rates sufficiently attractive to meet cut-throat competition from foreign sources, and shipowners aver that they are not in a position to offer the needed help to trade development. What shippers have to pay was discussed at a recent meeting of the Liverpool Chamber of Commerce, when it was stated that whereas pre-war freight rates between Great Britain and North America were 7s. 6d. per ton, these had grown by March, 1924, to 20s., and at the present moment are 40s.

Representative action in one respect has been undertaken by the Federation of British Industries by addressing the Mersey Dock and Harbour Board on the question of porterage charges at Liverpool docks. It is pointed out that the charges are out of all proportion to the actual cost and value of the services rendered and suggests that causes lie in fixed profits being maintained for contractors, whilst, despite the great number of master porterage establishments which have to be paid, there is a total absence of competition between them.

A More Hopeful Outlook

Signs are, however, not lacking that a more hopeful condition of affairs is unfolding. Much of the surplus shipping which grew during the war is either disappearing or doing odd jobs in coasting trade and thus regularising freights in the interests of both owners and shippers. Marine insurance rates are definitely lower on account of the severe competition put up by the many insurers who have entered this line of business, whilst the disparity in freight rates between British and continental ports, although a matter of immediate concern is likely to be removed in the near future. Labour costs, particularly on German ships, are moving upward and, moreover, competition from the continent is resolving itself into a conference system. It is still more economical to ship via Belgian and German ports rather than direct from the United Kingdom, but, on the other hand, although freights from the former have risen four-fold since the war, some continental lines are not paying their way and favour a freight conference. Dutch, German and French shipping is tending to participate especially in South American trade. This will almost inevitably result in higher charges by our rivals.

A move in another sphere also offers encouragement, as the Port of London Authority has ventured a reduction in both dock dues on vessels and handling charges for goods. Since February 1 of the present year imported and exported commodities are charged 7½ per cent. less on landing and extra charges, other than rent, whilst dock dues, discharging costs and additional rent for shipping are similarly reduced. After the rise in these expenses recorded about a year ago the reduction certainly represents a relief to traders and shippers.

Export Credit Scheme

Arising out of the continued unsettled conditions, there is one beneficial result to be noted in the efforts which are being put forward by interested parties to assist shipping. There is, for instance, the memorandum on credit insurance, in which the Federation of British Industries suggests a method of increasing overseas trade. It looks at business very much from the point of view of the consumer, and maintains that increased volume of exports would be achieved provided credit could be granted more freely to the foreign buyer. Many firms realise that their customers require just the same credit facilities as they received before the war, but changed circumstances do not permit this and therefore an extensive credit insurance is needed.

Cheap financial facilities should be available to exporters, and would probably bring speedy result if confined to business involving no more than ordinary trading risk and not as an insurance against eventual loss from bad debts. The work of the Export Credit Department of the Board of Trade might well be sub-divided into sections dealing with normal and abnormal risks. This department has, of course, functioned for some years in the financing of export trade and has not always met with unqualified approval, but its principles are worthy of attention. Originally operating to make advances, the practice is now to attach the name of the Government to the bill, thereby giving this a backing of the highest value and enabling the exporter to obtain cheap credit from his bank. New conditions were drawn up during January last, and traders may obtain the guarantee either for general or specific credit. Such facilities should be widely known. For the cost of a small premium the Government shoulders the initial risk and in suitable cases is prepared to guarantee, without recourse against the exporter up to 42½ per cent. of any loss which may occur on a particular transaction. Security can be asked of the exporter, and where the latter is prepared to accept full recourse a reduced premium is allowed.

Under this system of specific guarantees the official statistics show that almost £20,000,000 worth of bills has been assisted during the last four years, and that in the first three months of 1925 guarantees have been extended to another £170,000.

The second means of assistance is by way of a general credit, for which application must be submitted through a bank, giving particulars of the amount, period and name of country with which business is desired. Generally speaking, such credits are allowed up to six months, during which period the exporter is at liberty to enter into transactions to the stipulated limit and undertakes the liability for loss up to the extent of 57½ per cent. in case of default by the importer. The credits under this scheme since 1920 have amounted to £6,500,000 and during the first quarter of the present year are valued at £168,500. Many exporters are therefore taking advantage of the facilities and eliminating financial risks.

Variations in Exchange Transactions

Fluctuations of the foreign exchanges, however, occur quite apart from this and the buying of exchange forward is still urged as fundamental to all except the very largest exporters. Improving economic conditions of many foreign countries have not as yet stabilised exchanges and trading has had to be safeguarded during the past year. An example of the variations which have been experienced with France is illuminating. At the beginning of 1924 French francs stood at 84.75 to the pound sterling. Within a fortnight this moved to 98.25 and by February 20th was 103.60, falling still further to 119 in March. At the end of April this exchange quotation was halved, followed by a continued upward trend throughout the year till the rate became 87 in December. All these changes were faithfully reflected by Belgian francs and in a smaller degree by Italian lire, whilst Spanish pesetas, Swiss francs and Dutch gulden have all shown frequent movements. In the course of the year Germany has completely changed her currency unit in replacing the billion-mark by one Reichsmark and in other parts the Argentine dollar is representative of variations with a value varying between 40 and 46 pence.

The Tariff Problem

Tariffs, unfortunately, still continue to be amended, increased or withdrawn, and up-to-date information is essential to exporting firms. Many important countries are known to be engaged in the preliminary work of tariff revision, including the Dominions of South Africa and Australia. The former, for instance, is entirely changing the nature of the duty, as white lead—either in oil or dry—has previously paid 17 per cent. *ad val.* and is now to be taxed at 6s. per lb. in small packages and 10s. per lb. on packages over 50 lb. in weight

whilst at the same time the 3 per cent. preference rebate is being withdrawn from ammonia salts, dyestuffs and heavy acids, so that these will pay the full 20 per cent. tariff.

Among Australian imports from this country, barium compounds, dry ground earth colours, linseed and turpentine have been scheduled as raw materials for the purpose of the new preference conditions. At the moment, there is before the French Senate a Bill which will modify the tariff upon most imported chemicals, but duties on coal tar dyes are to be advanced in some cases by 100 per cent. and varnish will pay 20 per cent. more than at present. Another proposed tariff is being considered in Switzerland, where the new levies will range from 1 franc per 100 kilos. upon chlorosulphuric acid to 30 francs per 100 kilos. on coal tar derivatives and 50 francs per 100 kilos. on bronze colours. In Czecho-Slovakia many restrictions have been withdrawn, and it is now possible to import into that country, without licence or declaration, dye extracts, fertiliser salts (except Chile saltpetre) and nickel sulphate. Together with the State taxation of products, the packing of these is now coming forward for very close attention. The senior British Trade Commissioner for Canada says that unless packed in wood-wool and so marked, containers and cases will be liable to examination and may be refused landing. All packings of hay, straw and fodder must be accompanied by a certificate from official veterinary officers in the United Kingdom stating that the packing has been thoroughly disinfected. It is most important that such certificates should be attached to the bill of lading for identification with the goods, as already shipments of British goods have been refused entry into Canada and have been returned to this country.

Other regulations which have recently come into force include a Spanish decree, operative since March 13, that merchandise imported into Spain must be valued on a gold basis and that the original buying invoice is to be attached to the clearance declaration in order to pass goods through the Customs. Cuba has also introduced a clause this year requiring commercial invoices to be presented to Cuban Consulates with a sworn declaration, made before a notary public, as to the accuracy of the prices contained therein. In several of these smaller markets petty details necessitate rigid observance, but the business is well worth while.

Dominican Demands

The most recent survey by the U.S.A. official commerce reporter dealt with the Dominican Republic, where a wide range of demand for industrial chemicals exists and an expanding trade is being done in imported paints and varnishes. In view of the large proportion of the business which is being secured by France and U.S.A., the attention of British manufacturers seems desirable. No paints or varnishes are made locally and other products in request are acetic acid, sulphuric acid and ammonia compounds. The helpful remarks of the resident British Consul are fairly applicable to all of the Central American trade. Most of the best importing houses are able to obtain 60 to 90 days' sight credit from American and continental manufacturers, and the essential point for British firms is to confine their efforts solely to these reputable importers. There are, however, reliable but impoverished houses which just survived the trade depression and are unable to remit cash against documents in London, but can pay on arrival of the goods. Business with these can be conducted through a recognised channel of consigning the merchandise to a local bank, to which the bill of lading endorsed " to order " or " to order notify " attached to the sight draft may be mailed.

For this area U.S.A. weights and measures and quotation in American dollars are very desirable, and if impossible to quote a fixed rate in dollars the importer can be assisted by showing the dollar equivalents at a stated rate of exchange. In addition to drawing the draft in the accepted currency, competition calls for c.i.f. quotations, and this imposes a great onus upon the exporter of knowing completely all the charges to be met with en route.

Parallel with this is the need for full scrutiny and understanding of the terms contained in the bill of lading. In a recent case, where powdered product was damaged by seawater, which entered a deck-house where it was stored, the shippers had apparently allowed the shipowners to contract out of the common law liability of " seaworthiness " and the loss therefore fell upon the owner of the goods. The definition of the functions and actual limitations of responsibility to be assumed have been a long-standing difficulty between the various interests in a voyage, as carriers by sea have always been very free in law to take to themselves the privilege of " excepted perils," and there has thus grown up an absence of uniformity in bills of lading and charter parties. With the passage of the Carriage of Goods by Sea Act 1924, which became effective at the beginning of the present year, a standardisation of liability becomes possible in the interests of shippers, carriers and bankers. The practice of disclaiming responsibility for many of the " perils of the sea " will be set aside and all bills of lading for shipments, other than coast-wise traffic, must be issued subject to the new rules and must contain an express admission to that effect.

This new regulation upon shipowners applies only to their sea-activity and does not in any way bind them in their capacities as forwarding agents or warehousemen. The receiver of the goods is protected in being permitted to claim for loss or damage up till 12 months after delivery or the date when the goods should have been delivered. Moreover, the forms of different classes of bill have received attention. The " received " bill is recognised as being merely a temporary receipt for the goods and must be given by the shipowner on demand, but after the goods have been shipped this may be exchanged for the ordinary " shipped " bill at the port of shipment.

This new legislation may present another initial difficulty to the export trade, but it is to be hoped that such standardisation by bringing all companies into line will in the long run materially assist the development of our overseas connections and facilitate the business of carriers. So long as British shipping remains in any degree below its pre-war activity, so long will chemical exporters be operating at something less than their full capacity.

Danish Margarine Developments

THE Danish margarine industry has seen considerable development in the last few years. The number of margarine factories has increased from about 20 in 1910 to 110 in 1923, no less than 30 were established in 1923, and the position now is such that nearly every town and large railway centre in Denmark has its own local margarine factory.

The total production of margarine in 1923 was 65 million kg. against 55 to 56 million in the three preceding years. Of the whole quantity produced in 1923 7·9 million kg. was essentially made of animal raw material, and the remainder of vegetable raw material.

For many years now the production of animal margarine has been diminishing in favour of vegetable margarine. In 1906–10 animal margarine totalled 14·8 million kg. and vegetable margarine 9·8 million; in 1911–15 the proportion was reversed, and the figures were 7·0 and 29·2 million kg. respectively, while in 1920–22 they were about 4 and 44 million kg., and in 1923 4·5 and 50·5 million kg.

The following table shows the quantities of the various raw materials used in the three years specified :—

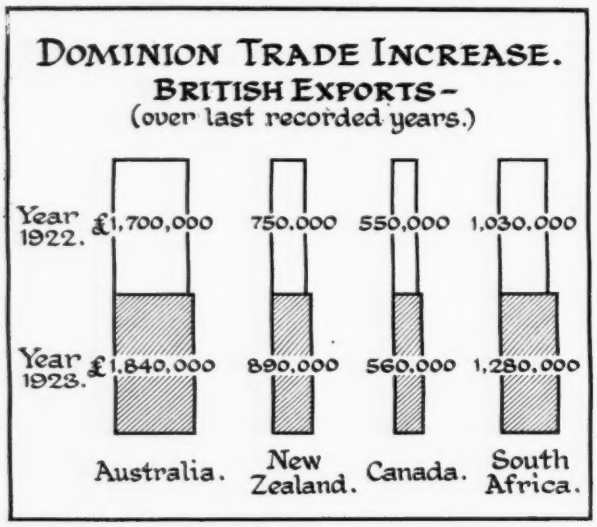
Animal Products.	1923 mill. kg.	1922 mill. kg.	1921 mill. kg.
Oleomargarine	1·09	0·87	0·79
Premier jus, etc.	2·32	2·16	2·08
Neutral lard, etc.	0·47	0·51	0·50
Other animal products	0·65	0·29	0·17
Total	4·53	3·83	3·54
Vegetable Products.			
Cocoanut oil	34·97	29·50	29·32
Palm oil	0·55	0·71	0·76
Arachid oil	3·05	1·73	1·24
Cotton oil	2·81	4·02	5·59
Sesam oil	4·50	4·24	4·18
Soya-oil	3·40	2·11	1·54
Hempseed oil	0·47	0·03	—
Hardened oil, etc.	0·73	0·83	0·87
Total	50·48	43·17	43·50
Various other products	0·13	0·02	0·01
Grand total	55·14	47·02	47·05

Exports to Empire Countries

On the Up Grade

ONE of the best aspects of our overseas trade is the extent to which British manufacturers are meeting the requirements of the Empire. With each one of the four dominions, business is increasing in a highly satisfactory manner and showing excellent promise. During the latest statistical years 1922 and 1923, the total dominion imports from this country have grown by over £500,000 and this denotes an 8 per cent. increase by Australia, 20 per cent. expansion in New Zealand and nearly 25 per cent. larger trade with South Africa.

These improvements are all contributing to gain for us a larger proportion of the requirements of the individual markets, as shown by the most recent New Zealand government figures, where our share of total imports has grown from 46·8 per cent. in 1921 to 59·3 per cent. in 1923. Thus in this area we supply most of the white lead, three-quarters of the total purchases of liquid paint and almost one-half of dry colours. The aggregate British exports of paint and colours to New Zealand is now £520,000, whilst other large consignments are £124,000 of disinfectants and insecticides, £34,000 of sodium carbonate and £18,000 worth of cream of tartar. In several directions



this market is second only to Australia and relative to its population represents one of our best world customers.

Another worth-while market is Canada, especially in connection with muriate of ammonia, our exports to this country being valued at £10,000 in 1922 and £14,000 in 1923, thus amounting to more than the purchases of all the other dominions. This area also purchases the bulk of our trade in coal-tar oils, now exceeding £96,000 a year and is also our leading customer to the extent of £87,000 for silicate of soda. Altogether Canada takes a larger range of our products than most of the countries outside the Empire, but progress is exceptionally difficult on account of the proximity of a watchful trade rival possessing greater facility for dispatch in addition to other economic advantages.

The areas of our largest Empire trade are undoubtedly located in South Africa and Australia. British exports to the former have expanded notably, and in glycerin alone, the total taken from this country during 1923 was in excess of £120,000, or £40,000 larger than in the previous year. This, taken together with disinfectants and also the cyanide demand from the mines, makes up approximately 50 per cent. of the South African trade and marks this dominion as an outstanding market for these products. Disinfectants are now purchased from the United Kingdom to the extent of £160,000 and cyanides valued at almost £300,000, whilst other good consignments are to be noted in caustic soda and also the silicate.

With Australia the growing textile industries give rise to the best demands for dyes and dyestuffs, but the trade is pre-eminent in several respects. This is by far the best dominion purchaser of cream of tartar, tartaric, citric, and boric acids, whilst sodium carbonate at £203,000 and caustic soda at £111,000 stand for exceptional business. Moreover, the proportion of demands which goes to competitors is small, so that progressive increase in our supplies may be anticipated. Not a few products which find little support in other dominions are purchased by Australia in good quantities, as, for instance, £23,000 of magnesium compounds and £11,000 of potassium iodide, but the disinfectant imports from British manufacturers are relatively low. The great number of products with which business is effected with the dominions is sound ground for expectation of developing trade, and although the present bulk represents the smaller proportion of our total overseas' sales, the relative ease of trading will attract export-work as their demand becomes more effective.

Chemical Trade at the Ports

THROUGHOUT Great Britain there are 40 different ports actively engaged in the import and export trade with chemicals. These may be analysed into 6 Scottish ports, 13 on the west coast of England, 14 east coast and 7 south coast ports. Comparing these broad divisions according to the value of chemical shipments 54 per cent. of imports enter through west coast ports, 33 per cent. on the east coast and 12 per cent. into Scotland. British exports are also dealt with in very similar proportions, as more than one-half passes out of docks along the west coast and approximately 44 per cent. from the east coast.

The largest business of all is handled at Liverpool and Birkenhead, where the import of chemicals in the year 1923 was valued at £2,180,000 and the export at £8,600,000, both of which totals are far in advance of those for any other shipping centre in the United Kingdom. In addition, these figures indicate a greatly increased trade as compared with the previous year, when the imports amounted to £1,880,000 and the aggregate of exports was £7,400,000. The two Mersey ports are thus normally responsible for a large proportion of the total British import and export trade. Including Manchester, which took the place of London as the second largest import area in 1923, the district actually imported as much as all other British ports combined.

London's Exports

From the point of view of export work, London is the second most prominent port, with exports which have expanded from £4,600,000 in 1922 to over £5,000,000 in 1923, whilst the next in importance are Middlesbrough and Glasgow, which have respectively exported £1,820,000 and £1,650,000 worth of chemicals during the latter twelve months.

Practically all the Scottish exports are shipped from Glasgow and Leith, and about three-quarters of the import trade is dealt with by Glasgow and Ardrossan, followed by Leith, where the fraction is about 17 per cent. of the whole Scottish figure.

Among other leading centres on the import side, the Humber concentration of Goole, Grimsby and Hull is distinctly imposing. This area imports a total similar to that of London and is outstanding along the east coast, the main port being Hull, where imports reach £585,000 annually. Exports are also relatively high from the last-named and now total £800,000, but even so are trebled by the combined export trade of Middlesbrough, Newcastle and Sunderland. Apart from London a larger volume of shipments is effected from these three ports than at any other part of the east coast, but the import trade is negligible. This may be attributed to the magnitude of the exports of sulphate of ammonia in which Middlesbrough specialises.

Along the south coast, business is inclined to be small, with Southampton as the leading export point and Plymouth as the centre of main imports. Other useful ports, on the west coast, are Bristol, with an import trade above £200,000 and exports at £170,000, and Swansea, which confines itself to the export side and ships about £725,000 worth. Among the individual constituents of imports benzol in largest quantities lands at Barrow-in-Furness, potash fertilisers at Great Yarmouth, Barnstaple and Rochester, calcium carbide at Bristol Channel and Humber ports, whilst Chile nitrate is common to all the larger ports. The Bristol receipts include much tanning extract, Goole takes big quantities of dyestuffs, whilst the London trade is composed mainly of paints and colours. Liverpool is the leading export centre for ammonium sulphate and shipped 72,000 tons in 1923, as compared with 32,000 tons from London and 9,000 tons from Glasgow.

The Constitution of Glass

A London Symposium

THE May meeting of the Society of Glass Technology, which was held in London on Monday and Tuesday, was devoted to a symposium on the constitution of glass. Although not officially a joint meeting of the Faraday Society, the Optical Society, and the Physical Society, the members of these bodies were offered a cordial invitation to take part in the proceedings, and some important contributions were secured from scientific workers and members in France, Germany, and the United States. Contributions, however, from Dr. F. Eckert (Glaswerke Ruhr, Essen, Germany) and from Dr. A. A. Lebedeff (Optical Institute, University of Leningrad, Russia) were not received in time for presentation at the meeting.

The first session was held on the evening of Monday, at the Royal Society of Arts, London, when five of the papers were presented.

The symposium was opened by Professor W. E. S. Turner (of the Sheffield University, and Hon. Secretary of the Society of Glass Technology), who has taken such a prominent part in the development of the glass industry in this country, both on the theoretical and practical side, and who was also responsible for the formation of the Society itself. He reviewed generally the whole position, and dealt with the outstanding difficulties the elucidation of which are of the greatest possible importance to the practical glass maker.

Apart from the general review by Professor Turner, which pointed more to the nature of our present knowledge, and difficulties yet to be surmounted, the remainder of the papers may fairly be described as of a highly technical and theoretical nature, although, in saying this, it must not be inferred that they were not of ultimate practical interest. For instance, the paper by Prof. G. Tammann (of the University of Göttingen, Germany), on "Glasses as Supercooled Liquids," discussed the newer ideas which have come into being since glasses were considered as particular modifications of the solid state, and as having definite melting points assigned to them. The question of the relation of glasses to the other phases of matter remained indefinite until researches on the process of crystallisation indicated that glasses are supercooled liquids. The practical application of this class of research is obvious, and a great deal of valuable scientific information is contained in the paper concerning the crystallisation of mixtures.

Constitution and Density

A long contribution by Dr. A. Q. Tool and E. E. Hill (published by permission of the Director of the Bureau of Standards of the United States Department of Commerce), on "The Constitution and Density of Glass," developed a working hypothesis which appears to co-ordinate many of the effects observed in glass. A consideration of the conclusions arrived at indicates that the condition of a glass is one which is intermediate between the liquid and solid states, and the results indicated are of practical importance in determining the relationships between glass compositions and the resultant physical and chemical properties.

Another contribution from the Bureau of Standards, Washington, was by Dr. G. W. Morey and Dr. N. L. Bowen (of the Geophysical Laboratory, Washington), on "The Ternary System Sodium Metasilicate-Calcium Metasilicate-Silica." This was the longest and most detailed contribution of the whole series, the work discussed consisting of an experimental study of the ternary system Na_2O, SiO_2-CaO, SiO_2-SiO_2, by the method of quenching. A series of new compounds which have been found, and whose properties have been determined, are indicated, and the results are given in a long series of tables and curves.

Finally, at the first session, a paper on "The Viscosity and Allotropy of Glass," by Prof. H. Le Chatelier (of Sorbonne University, Paris), was presented, in which were discussed the results of Messrs. Washburn and Shelton, and of Mr. English, in relation to the very important property of viscosity in glass, upon which depend methods of manipulation, blowing, moulding, drawing out, etc. Whilst recording that the experiments of these investigators have caused much progress to be made in our knowledge, Prof. Le Chatelier suggests the desirability of carrying their work further to clear up the discrepancy which exists as to the temperature region where the allotropic transformation of glass takes place, and to determine the effect of variations of proportions of silica.

The symposium was continued in the afternoon of Tuesday, at the University College, Gower Street, and the first item was an interesting discourse by Sir William Bragg, on "The Structure of Quartz and Silica." He described a new theory of the structure of quartz, which, he said, bids fair to be more successful in solving this problem than the work which was carried out 11 years ago, and which latter was regarded as a partial solution. The new theory is based on the fact that quartz changes its structure on passing through 575 deg. C., the high temperature quartz being more symmetrical than the low.

A short contribution by Dr. G. W. Morey and Dr. R. W. G. Wyckoff (of the Geophysical Laboratory, Washington), on "X-Ray Studies of Soda-Lime-Silica Glasses," was a preliminary note upon an attempt to establish the origin and cause of X-Ray diffraction effects, but extended discussion of the results was deferred until the authors have examined carefully many more glasses differing from one another and from those already studied both in chemical composition and in mode of preparation.

Mr. Vaughan H. Stott (of the National Physical Laboratory) followed with a paper on "The Viscosity of Glass." This detailed some careful work now being carried out at Teddington, which was illustrated by some 20 curves. The paper reconsidered, in the light of additional determinations which have been carried out at the National Physical Laboratory, the Measurements of Washburn and Shelton and of English, and suggested that some modification of the conclusions drawn by Le Chatelier is necessary.

The Seventh Annual Dinner of the Society was held at the Hotel Cecil on Tuesday.

Institute of Chemistry Pass Lists

THE following is a list of the successful candidates at the April-May Examinations of the Institute of Chemistry:

Examination for the Associateship in General Chemistry.—Kathleen Margaret Monteagle Barlow, B.Sc. (Lond.), University College, London; Edward Francis Burns, King's College, London; William Alan Cash, A.M.C.T., College of Technology, Manchester; William Challis, A.M.C.T., College of Technology, Manchester; Harry Norman Clear, B.Sc. (Lond.), East London College and Belfast Municipal College of Technology; John Greenwood, A.M.C.T., College of Technology, Manchester; Harold Herbert Hatt, University College, Southampton; Harry Bulwer Hayley, B.Sc. (Lond.), Birkbeck College, London; Ernest John Holmes, University College, Southampton; Donald Ernest Ladhams, University College, Southampton; Walter Lewis Lee-Smith, King's College, London, and Sir John Cass Technical Institute; Malcolm McFarlane Love, Technical College, Paisley; Raymond Frank William Selman, Chelsea Polytechnic; John Graham Sherratt, B.Sc. Tech. (Manc.), College of Technology, Manchester; Ernest Lester Smith, Chelsea Polytechnic; William Edward Stafford, A.M.C.T., College of Technology, Manchester; Neville Gilbert Sparkes, B.Sc. (Lond.), Sir John Cass Technical Institute; John Samuel Thompson, B.Sc. (Lond.), trained under G. E. Johnson, B.Sc., F.I.C., at the Technical College, Hull; William Warren, B.Sc. (Lond.), West Ham Municipal College; Thomas Pearl Williams, B.Sc. (Lond.), Central Technical School, Liverpool.

Examination for the Fellowship.—In Branch A—Inorganic Chemistry, Section III, Manufactured Products: Arthur Price, B.Sc. (Lond.). In Branch D—Agricultural Chemistry: Ellis Thomas Harris, M.A. (Cantab.). In Branch E—The Chemistry (including Microscopy) of Food and Drugs and of Water: John Arthur Heald, B.Sc. (Lond.); George King, M.Sc. (Lond.); Arthur Frank Lerrigo, B.Sc. (Birm.); Andrew Francis MacCulloch, M.A., B.Sc. (Edin.). In Chemical Technology, with special reference to Low Temperature Carbonisation: Duncan MacDougall, A.R.T.C.

American Dye Imports Increasing

OFFICIAL figures for April reveal the fact that U.S. dye imports are increasing as compared with last year. The value this April was $426,141, as compared with $183,789 in April, 1924. The figures show that this year Germany contributed 46 per cent., Switzerland 34 per cent., and England 6 per cent. Last year for April England's figure was 2 per cent. Synthetic dyes imported for the first four months of this year have totalled 1,761,212 lb., compared with a corresponding figure of 879,861 in 1924.

Brunner, Mond, and Co.'s Annual Meeting

Review of Great Chemical Developments in Progress

At the annual meeting of Brunner, Mond and Co., in Liverpool, on Thursday, May 21, the Chairman (Mr. Roscoe Brunner) reviewed at length the position of the company and its associated concerns, and indicated several important chemical developments in progress, including the extension of the synthetic ammonia plant at Billingham, the establishment of new ammonia soda works at Wallerscote, Cheshire, and the reconstruction of the Magadi Soda Co. We give the substance of the Chairman's statement below.

In moving the adoption of the directors' report and statement of accounts and the payment of dividends to the holders of Preference shares at the rate of 7½ per cent. per annum, less income-tax, and to the holders of Ordinary shares at the rate of 10½ per cent. per annum, less income-tax, Mr. Roscoe Brunner said :—

Dealing first with the profit and loss account, I would point out that the gross profits are up by £120,000, and the investment revenue is down by £65,000. This latter is accounted for by the transfer of capital from interest-bearing investments to investments in our own works which at the moment have not arrived at the profit-bearing stage.

Productive Expenditure

Turning to the balance sheet, and dealing first with the assets, the first item—freehold lands, houses, works, etc.—is increased by £489,000. This is not a record figure, but it is a pretty big one. There has been considerable expenditure, first, on boilers at Winnington, which has greatly increased the efficiency of the installation ; and, secondly, on the caustic plant at Winnington and the soda ash plant at Lostock, which has increased the output of those plants. Further, there has been considerable expenditure on the new ammonia soda works at Wallerscote. You will notice that no less than £384,000 has been written off the value of the freehold land, works, etc. The investments show an increase of £550,000, partly in synthetic ammonia at Billingham, partly in the Magadi Soda Co., and partly in Brunner, Mond (Australia), which is a new company. Stocks have increased by £137,000 due to our increasing trade. The debts due to the company show a decrease of £1,100,000, partly due to payment of the last instalment of the debt owing by Enterprises, Limited, for the sale of the soap works shares ; partly due to the fact that our foreign offices have made very heavy remittances during the year, and due also to a reduction in general sales balances outstanding. Cash is down by £1,100,000, but this is more than accounted for by the great reduction in debts due by the company.

On the liabilities side the share capital is increased by £28,800, due to the issue to the staff and workpeople of the shares you authorised us three years ago to offer to them from time to time. The general reserve is increased by last year's vote, plus the premiums on the shares issued to employees. Depreciation is increased by the year's charge of £200,000, and reduced by the special charge of £384,000, already mentioned as written off.

The suspense account is decreased by £25,000 after crediting last year's vote.

The savings bank deposits of our employees is up by £31,500, in spite of the fact that there has been withdrawn a considerable amount to pay for the shares allotted to them, and I think everybody is to be congratulated on the saving spirit displayed by our workpeople. The debts due to the company have been reduced by £1,500,000. We have taken the opportunity during the year of using the large cash balances which the company have accumulated in paying off debts, including a settlement of arrears of taxation going as far back as the time of excess profits duty, and in repaying the loan of American dollars, to which I referred at the meeting of 1921.

Wallerscote Works Nearing Completion

I have referred to our Wallerscote works. They are now nearing completion, and will very soon reach the producing stage and make a contribution to profit, instead of being a drain on our cash resources, as they have been during the process of construction. They embody a considerable amount of improvement on previous practice, and we have confidence that their cost of manufacture will be lower than that of any of our other works—in fact, we believe their cost will be the lowest of any works manufacturing soda in the world. (Hear, hear.) We have for some time past ceased to be manufacturers of soda products only. Some of our other companies make some of our own products, but, in addition, they make chlorine and chlorine products, acids, limestone and lime (and a good many other things of smaller tonnage), and last, but by no means least, pure ammonia and ammonia salts, including a large tonnage of sulphate of ammonia at Billingham.

The Billingham Works

During the past few weeks a certain amount of curiosity has been evinced in Parliament and in the Press about our Billingham works and the price we paid for them. We have set out the facts in the Press over the signature of our colleague, Colonel Pollitt. We have proceeded very cautiously at Billingham. The first step was to erect an experimental plant of a capacity of one ton of pure ammonia per day at the Weston Point works of Castner Kellner, using the hydrogen evolved from the cells. The next step was to put up at Billingham a research laboratory, which cost no less than £80,000, and by the aid of that research laboratory our directors and staff there have been able to design and put into effect considerable improvements upon the original Haber process.

Then we erected at Billingham a plant of the nominal capacity of 30 tons of pure ammonia per day, and much of the work was entirely new to British engineering. That plant took a long time to build ; considerable difficulties were encountered ; there were bottle-necks which had to be widened out, and for a long time the average make was below the 30 tons per day for which the plant was designed. During that time the plant was not running at a profit, and it took a great deal of courage to decide, as our directors did decide, to increase the plant from 30 to 50 tons per day. The enlarged plant is not yet ready, but the 30-ton plant is now running smoothly at full output and is showing profits after charging all proper charges to cost and making ample allowances for depreciation. (Hear, hear.) The ammonia is converted into sulphate of ammonia, of which 3·8 tons are made from one ton of ammonia, and the sulphate is readily saleable at top prices because it is the purest in the country.

We recently made application to the Advisory Committee under the Trade Facilities Act, and have just concluded an agreement with the Treasury whereby we obtain a Government guarantee for an issue of £2,000,000 Debentures secured upon the whole undertaking, which money will be used to increase the plant from 50 tons to 150 tons of ammonia per day. Brunner, Mond and Co. are advancing the money necessary to increase the output to 200 tons a day, and the resultant sulphate of ammonia would be 760 tons per day. We shall not, however, convert the whole of the ammonia into sulphate of ammonia, but shall make other ammonia salts as the market requires. That issue of debentures cannot be made for some months, but no delay is being caused thereby, for the designing of the plant is already in hand ; a number of orders have been given out, and others will go out in due course. The whole of the £2,000,000 is to be spent in this country and we count ourselves fortunate in that we are able to help the struggling engineering trade to this extent. (Hear, hear.)

Your congratulations are due to Colonel Pollitt, who has been in executive charge of Billingham since the very beginning, and his lieutenant and colleague, Mr. H. A. Humphrey, who have so ably led their brilliant staff to secure this fine achievement. (Hear, hear.) We have no doubt that our present cost of production compares favourably with that of any other maker in any part of the world. Brunner, Mond and Co. hold all the ordinary shares and will continue to hold them. Finally, our experts have examined all the other processes for making synthetic ammonia, and we have come to the definite conclusion that none of them, whether Claude, Häusser, or Casale, can offer any advantages over our own.

Magadi Soda Developments

Last year I referred to the proposals we had made for the reconstruction of the Magadi Soda Co. After very long delay those proposals were accepted with some modifications. A new company has been registered and is at work, although owing to the law's delays the old Receiver is not yet out of the way and the Official Receiver is not yet done with. The directors of that company include three of our own colleagues, Mr. Gold (chairman), Mr. Nicholson, and Mr. Colegate, and our sales manager, Mr. Houston, a director appointed by the Colonial Office, and one appointed by the debenture-holders. These directors are in charge nominally though not yet fully. Some months ago we sent a commission of three of our own staff to Lake Magadi to study conditions on the spot, and their report is in course of preparation.

You will have seen the note at the foot of our balance-sheet referring to a contingent liability in respect of uncalled capital in the Magadi Soda Co. on March 31, 1925. This refers to an undertaking on the part of our own company to subscribe for £100,000 of Ordinary shares and up to a limit of £150,000 of 12½ per cent. Preferred Ordinary shares, unless, as to the latter, the shareholders of the Magadi Soda Co. take them up. A considerable amount of those Preferred Ordinary shares has been taken up, but our limit of guarantee is £250,000. We have undertaken towards the Colonial Office to develop the lake to its utmost commercial possibilities. It is too early to say anything about the prospects of the company, but it is true to say that the concern has ceased to make losses. Humanly speaking, it will never pay to bring Magadi ash to this country, and the markets for that company must be found where its geographical position gives it an advantage.

The Chairman, in giving reasons why a consolidated balance sheet was inadvisable, added that all their subsidiary companies, with the exception of Synthetic Ammonia, Ltd., and their Eastern companies, published their own accounts. Synthetic Ammonia had not up to now published accounts, but it was in process of being changed from a private company to a public company, and in future it would have to publish them. Remembering that their Eastern companies were only merchanting firms, they would see that a consolidated balance sheet was wholly unnecessary. He concluded with a criticism of the Budget proposals, and pointed out that the artificial silk duties would affect the chemical trade which supplied large tonnages of various materials to the industry.

Sir Alfred Mond seconded the resolution and supported the chairman in all he had said as to the commercial and industrial position of the country and the need for economy.

The resolution was unanimously carried.

On the motion of Mr. Emile Mond, seconded by Mr. G. W. Balfour, the retiring directors were re-elected.

Shares for Staff and Workpeople

A resolution was unanimously agreed to empowering the directors from time to time to issue to the staff and workpeople of the company (not being directors) and to the staff and workpeople (other than directors) of those associated companies in which the company holds not less than 90 per cent. of the Ordinary capital, Ordinary shares of the company to a number not exceeding 100,000, without such shares being first offered to the Ordinary shareholders in proportion to their holdings.

A special resolution was moved by the Chairman, seconded by Mr. J. H. Gold, and carried, amending the memorandum of association in order to facilitate financial co-operation with other companies; to facilitate the investment of the company's funds; to empower the company to institute and support provisions for the welfare of persons who are or have been employed by the company, and their dependents, and to empower the company to assist charitable and other objects.

The meeting closed with thanks to the officials, staff, and workmen, and to the chairman and his co-directors.

Freight Transport Costs

THE question of railway rates and a scientific study costs of are subjects that have received less attention than they deserve from firms that incur extensive transport. Mr. F. W. Rogerson, in a new book *Cost of Freight Transport by Railway* has endeavoured to rectify this and to describe methods of procedure in the development of a cost accounting system. The book is published from 27, Pembroke Place, Liverpool, price 4s. 4d., post free.

Proposed Protection for Gas Mantles

Comparison with Continental Conditions and Prices

THE Board of Trade Committee to inquire into an application by the Incandescent Gas Mantle Manufacturers' Association for a duty on imported gas mantles held its second sitting at the Board of Trade, London, on Friday, May 22.

Mr. J. P. H. SOPER (managing director of Monarch Mantles, Ltd.), who is leading for the applicants, stated that the exports of British mantles amounted to about three million mantles per year, and 95 per cent. of the export trade was to British Dominions. With regard to the flat rate duty suggested, he pointed out that this would have to vary according to the country because mantles were being imported from Italy at 16s. 11d., from Austria at 13s. 4d., from Poland at 19s., and from Germany at 21s. 4d. per gross. On the last occasion a 33⅓ per cent. ad valorem duty was imposed and this would represent about 7s. per gross on the German price, but to give adequate protection in the case of countries like Poland, Italy, and Austria the duty would have to be 10s. per gross.

It was stated by travellers that the public paid no heed to quality, so that the whole question resolved itself into one of price.

Mr. BENJAMIN BARK (works manager of the Wandsworth works of the Welsbach Lighting Co.) spoke of the conditions of labour in the British industry, and several operatives from various factories gave evidence confirming the conditions of employment, it being stated that at present all the works were on short time.

Mr. H. TALBOT (general manager of the Welsbach Lighting Co., Ltd.) gave evidence as to the results of his inquiries in Germany and Italy early this year with regard to the general position of the gas mantle industry there. The wages, he said, of female workers vary from the equivalent in English money of 2⅞d. per hour to 4¼d. per hour, according to age. At present the factories in Germany were working 48 hours a week, although the normal week was 54 hours. The general hygienic and other conditions of the factories were practically the same as in this country. For male workers the wages varied from 4⅛d. to 7¼d. an hour as against 1s. 2d. to 1s. 5d. an hour for similar labour here. The office and other salaries varied from £4 10s. to £15 per month as against £10 to £50 in this country. He gave the following comparison of costs in Germany as compared with the cost in this country:

	Marks.	English Currency Equivalent.	Prices in England.
Thorium Nitrate	10 p. kilo. ..	10s. ..	14s. 3d.
Ramie Yarn (2/32)	7m. 50pf. p. kilo.	3s. 4d. per lb.	3s. 4d. per lb.
Mantle Rings ..	14m. per 1,000 ..	14s. ..	18s. 6d.
Cardboard boxes ..	13m. ,, ..	13s. ..	25s.
Gas	16pf. per cubic metre with a rebate of 30%.	3s. 2d. per 1,000	3s. 1½d.
Electricity ..	15pf. per k.w. with rebate of 30%.	1½d. ..	1½d.
Coal	16 to 21m. per metric ton (Brown coal).	16s. to 21s.	37s. 5d. (broken coke).
Ether	92m. per 100 kilos.	5d. per lb.	8d. per lb.
Methylated Spirit..	36pf. per litre. ..	1s. 7½d. per gall.	2s. 3d. per gall.

The following comparison of the cost of raw materials in Italy and Great Britain was then given:

	Lira.	English Currency Equivalent.	Prices in England.
Thorium Nitrate	68 per kilo. ..	11s. 6d. ..	14s. 3d.
Ramie Yarn (2/32)	50 ,, ..	3s. 9d. ..	3s. 4d. per lb.
Mantle rings ..	90 per 1,000	15s. 1d. ..	18s. 6d.
Gas	0·68 per cubic metre less 25% disct.	3s. 3d. per 1,000 c. ft.	3s. 1½d.
Electricity ..	0·17 to 0·08 per unit.	0·33d. per unit to 0·16d. per unit.	1½d.
Ether	7·5 per kilo ..	7d. per lb. ..	8d.
Methylated Spirit	3·2 ,, ..	2s. per gall...	2s. 3d.

Witness added that if the home producers were to be placed upon an equal competitive basis with foreign manufacturers a duty on foreign mantles should be about 10s. per gross.

Mr. NICHOLAS W. BUIS said that Polish conditions of manufacture approximated to those obtaining in this country 40 years ago.

The inquiry was adjourned until June 4.

The Manuring of Meadows and Pasture Land

The Part that Nitrogen Plays

HITHERTO the opinion has been held that, besides good grasses, a good meadow or pasture should contain a goodly percentage of leguminous plants. As a manure, phosphoric acid and potash were recommended exclusively. The use of these plant-foods served in the first place to stimulate the growth of the leguminous plants, the plentiful development of which was intended to influence favourably the quantity and the quality of the herbage and indirectly to help in feeding the grasses with nitrogen.

Experience has shown that manuring with potash and phosphates always causes an increased yield, as compared with unmanured land, but the one-sided stimulation of leguminous plants prevents the grasses from attaining their full development. The conclusion is that unless the soil is naturally rich in assimilable nitrogen compounds it is not possible to obtain the maximum yield from meadows by the use of potash-phosphate fertilisers only. This applies even more so to pastures.

The conditions resulting from clover sickness and the withholding of sufficient nitrogen from the grasses lead to the breaking up of the grass surface and to the soil being insufficiently covered. When a mixture of clovers and grasses is cut for hay the leguminous plants and grasses do not wither at the same time, and consequently those parts of the leguminous plants that are rich in albumen are broken and are left on the field, while, owing to insufficiency of nitrogenous food, the grasses become tough and hard and offer a food less rich in albumen but containing more raw fibre.

The Modern View

During the last ten years the theory that meadows and pasture lands must be manured not only with potash and phosphates but also with nitrogen has been steadily gaining support. Good meadows and pastures consist of at least 75 per cent. good grasses and at the outside 25 per cent. of all other plants, amongst which leguminous plants are predominant. Experience has shown that yields sufficient in quality and quantity cannot be obtained from meadows and pasture lands if manuring is made favourable only for that portion which forms at most one-quarter of the surface. In that case three-quarters of the surface remains under-fed, as the indirect feeding of the grasses with nitrogen by the leguminous plants seems to take place only to a very limited extent. More protein is formed by manuring grasses directly with nitrogen than by encouraging clovers. It seems evident that a meadow or a pasture of which three-quarters is being suitably fed, and the remaining quarter is not being fed suitably, must yield a better result than if a method be followed which from the outset renounces the suitable feeding of three-quarters of the plants.

This theory has been confirmed by a great number of methodical manuring experiments. The following notes refer only to the experiments on manuring of meadows which the D.M.G. (German Agricultural Society) have published in No. 43 of their Bulletin under date of October 25, 1924.

The experiments show that in most cases the potash phosphate manures can only produce their full effect if and when accompanied by a dose of nitrogen. A further result is that, with few exceptions, the application of a total quantity of 600 kg. sulphate of ammonia per hectare (534 lb. S/A per acre) has brought about the highest gross increase of yield, calculated on 100 kgs. In this connection it is, from an economic point of view, of special interest to note that with the price of hay at M 5, for 100 kgs., and of ammonia at M 24, for 100 kgs., this highest gross yield meant at the same time the highest pecuniary profit.

The use of nitrogenous fertilisers changes, of course, the composition of the grass surface; the rate of development of the plants and the composition of the crop are essentially influenced. If the farmer desires to get the full economic benefit from the use of nitrogenous fertilisers he must change his methods of treating and exploiting meadows. In the first place, he must cut the meadows earlier so as to reap the grasses, which grow much quicker on nitrogenous fertilisers than on potash-phosphate manures, in that period of their growth in which they yield perhaps not the greatest quantity of hay but the greatest amount of easily digestible foodstuffs. With this object in view, meadows must be cut about 12-20 days (according to climatic conditions) earlier than those manured with potash-phosphates. In most cases this will gain sufficient time to have a second cut about 20 days after the date on which formerly the first cut used to be made. After the second cut, abundantly manured meadows still yield an extremely valuable aftermath, which will form a very valuable supplement to the then declining yield of the pastures proper.

If the time and frequency of cutting the meadows are thus adapted to the increased and accelerated yield, considerably more foodstuffs will undoubtedly be harvested from the same area than if the potash-phosphate system were followed.

Experiments carried out on the estate of the Agricultural College at Hohenheim in 1917 and 1918, the results of which have not yet been published, have shown that after using 60 kgs. of nitrogen per hectare (53 lb. nitrogen per acre equal to 252 lb. S/A per acre), of which two-thirds were given in winter (January to February) and one-third after the first cut (mid-June), the hay crop was only increased by 10-12 dozen per hectare (20 cwts.-24 cwts. per acre), but the quantity of digestible albumen, which formerly was 300 kilos. per hectare (267 lb. per acre), was increased by 120 kilos. per hectare (107 lb. per acre), and in especially favourable cases by 178 kgs. per hectare (158 lb. per acre).

Manuring the Pastures

Abundant use of nitrogenous fertilisers increases the quantity and quality of the meadow yields if one takes into account that the plants are growing quicker, and, in order to secure the maximum yield of plant food, must be gathered at an earlier period of growth than would be necessary when manuring with potash-phosphate. The intensity of meadow-manuring is therefore in agricultural practice more limited than is the manuring of pasture land, for the farmer has to get his work done with a given number of hands, which number is calculated on the average conditions of growth and weather.

Any temporary increase of work causes additional expense in wages or it leads to delays in the accomplishment of the work to be done. In both cases there will be a reduction of profits.

Quite different are the conditions in the case of pasture land where the reaping can be done by the grazing cattle themselves almost independently of weather conditions. Here one can easily arrange that the grazing is repeated more frequently the quicker the plants are developing. Only in this way is it possible to take the quantity of nitrogen used on pasture land considerably beyond that which is economically admissible for meadows. The intensity of nitrogen manuring of pastures can therefore considerably surpass that of meadows if only care is taken that there are always grazing cattle which consume the growing plants in the most favourable period of their growth.

Management and Results of Intensive Pasture-Farming

Up to 1916 the horned cattle pastures at Hohenheim could be kept in good condition by the application of liquid manure (urine) and potash-phosphate fertilisers. Their capacities were expressed by the fact that for the maintenance of one cow of 500 kgs. (1,100 lb.) weight, from the end of April up to the beginning of October an area of about 0·56 hectare (1·4 acres) of pasture was necessary. From the winter of 1916-17 onwards the pastures have been fertilised with 120 kilos. per hectare (107 lb. per acre) of pure nitrogen besides the usual manures (potash-phosphates and urine). During the rest of vegetation (November-February) 270 kilos. cyanamide (20 per cent. nitrogen) and during the summer months 300 kgs. sulphate of ammonia are applied per hectare (cyanamide 240 lb. per acre, S/A 267 lb. per acre). Of these 300 kilos. of sulphate of ammonia 150 kgs. are applied in late May, 75 kgs. in late June, and 75 kgs. in the middle of July, after the pastures have been grazed or mown.

The effect of this strong fertilisation was already visible in 1917 and was still more evident from 1918 onwards. For the maintenance of one cow of 1,100 lb. weight an area of no more than 0·7 acres was necessary in 1917 and could be reduced 0·51 acres from 1918 onwards. At the same time, the yield of milk per grazing day was considerably increased. In 1918 from late April to the beginning of October (say 150 days) the best pastures afforded 860 grazing days per hectare (300 grazing days per acre), taking into account the quantity of hay mown

between the grazing days (25 German lb. of hay=1 grazing day). The average figure is 750 grazing days per hectare for all the Hohenheim pastures. Since the quantity of milk yielded per grazing day was not less than 8 litres (1·76 gallons) per cow, the production of milk was about 7,000 litres per hectare (600 gallons per acre) at best. The average yield of the pastures in 1918 was considerably more than 5,000 litres per hectare (445 gallons per acre) over an area of 28 hectares (69 acres) of pasture.

The results did not decline in the following years; they were constantly obtained up to 1922.

The yields as above pre-suppose the accommodation of pasturing management to the conditions of production altered by the strong fertilisation by means of nitrogen. The first and most important principle for securing the utmost capacity of a pasture is the utilisation of the grass in its earliest development of growth. Grazing must, therefore, be started earlier in spring than would be done in pasture lands less heavily manured. Since the pastures produce much higher yields from the beginning of vegetation to midsummer than later on, care should be taken that either more cattle are put to pasture before this date or, if this be inconvenient for economical reasons, a part of the pastures should be used for obtaining hay. (N.B.—The best results are obtained from fields divided into small areas.) The mowing, however, must be done at a still earlier stage of development (8 in. to 9 in. high) than in the case of the meadow. Care must be taken that one and the same area will not be used for making hay during two consecutive years.

The experience obtained at Hohenheim showed that about 16 ha. out of an area of 28 ha. had to be mown once before June in order to secure the regular maintenance of a constant number of cattle during the whole period of pasturing. Grazing lasts as long as the milk is constant. During 5 or 6 days there are three sets of cattle on the pastures, graded according to their milking capacity. One-tenth of the area is cut mid-May, a further one-tenth is grazed and then cut at the end of May, a further one-tenth is cut in mid-June, and a further one-tenth is cut at the end of June. The crops of hay thus obtained were more valuable than those from the meadows, as they were obtained from grass in an earlier stage of growth. The hay was used for feeding cattle in full milk during the following winter season.

In general, pasturing of cattle at Hohenheim commenced towards end of April. Already a fortnight later hay-making had to be started in order to prevent the grasses developing too far, which would have tended to affect the yield of protein. Up to June 20 part of the pasture may be cut, after June 20 no more pasture is cut. From August 15 part of the meadow becomes available as pasture, *i.e.*, aftermath.

After June 20 the pasture is never cut again. The pasture mown at this time has already been pastured three times before. Pasture land is only cut once a year, and not *all* pasture each year but only part.

It is necessary to cut pasture because otherwise there would be more food than the cattle could eat. It is cut in the early stages of growth so that the hay will contain the greatest amount of digestible protein. For this purpose the grass is cut when a hand's length of height (8-9 in. high) and care is to be taken that such a cut will never be taken from one and the same piece of pasture during two consecutive years.

To carry out this programme it is necessary to have a relatively large number of pasture plots at one's disposal, which ought to be fenced off. For this purpose 28 ha. of pasture were divided into 10 detached plots at Hohenheim, their areas fluctuating between 1·8 and 5·3 ha. owing to the hilly nature of the ground. During the period of pasturing from the end of April to the end of October every enclosed pasture plot is grazed ten times (about 2 to 4 days each time), the cattle being all day and all night in the pasture. The result is that pasturing begins in a very early stage of development of the plants and, therefore, must very often be repeated in order to be able to keep the plants in the most advantageous stage of growth to obtain the greatest amount of digestible albuminoids for the cattle.

In order to take all these points into consideration and to make the best use of the food stuffs the following procedure has been applied :—

In the second half of March and first half of April the pastures for horned cattle are grazed by sheep. From the middle of April onward the sheep are withdrawn to their proper pasture (poorer and drier). Towards end of April pasturing of the horned cattle begins. The cattle are divided into three classes. The first class includes all the cows in milk that yield more than 10 litres (2⅛ galls.) of milk a day, the second all those yielding less than 10 litres, and the third includes the cows not in milk, the young growing cattle, and the colts. Each of the pasture plots having young and tender grass is first of all grazed by cows of high milk production, but this is done only for two days; the following two days the cows with a less yield of milk are in the pastures, and then for another two days the young cattle and the colts. Providing the cattle of high milking capacity with the most valuable foodstuffs in this way, the best use of the forage is being made. The effect obtained through feeding with concentrated foods during the winter season has been secured in the pastures in a simple manner, *i.e.*, by giving heavy milkers the best grass. Pasture must have 12 to 15 days' rest after each feeding bout, *i.e.*, after the three sets of cattle have all been fed.

It is not easy to bring home the practical accomplishment of such an arrangement to officials and other employees, because every third day the different classes of stock must be put to pasture in new plots. Furthermore, the choice of the pasture must carefully be made according to the present stage of development of the grasses, besides which it must be considered to what extent hay-making should be resorted to in order to secure in all pastures the most advantageous development of the grass and its highest utilisation. The experience gained at Hohenheim, however, has proved that a few weeks' practice will suffice to secure a practical accomplishment of the idea.

The economical result of this method of feeding is an extremely great one. It has tended nearly to double the yield of milk. The additional amount of milk per ha. amounts to about 2,500 litres of milk, the value of which is M.500 (£25) at the present day, whereas the expenses for 120 kilos pure nitrogen amount to M.150 (£7 10s.) at most. Adding to this wages and general costs of management, which in no case would reach the amount of M.100 (£5) per ha., the enormous financial profit from such an intensive fertilisation is obvious.

Meadows and Pasture Lands in Relation to Other Parts of the Farm

It is not possible to alter any one part of an agricultural estate, which ought to form one complete body, without considering in what manner the alteration will react on the other parts. If pasture lands and meadows are brought to the maximum of their capacity in the above-mentioned manner, the question will have to be examined at once whether the number of animals kept hitherto on the farm will be sufficient to exploit fully the produced foodstuffs, or whether a larger number of animals will be necessary for this purpose. Furthermore, it is to be considered what number of hands is necessary for doing the additional work and how this demand for labour is to be met. In the third place it is to be considered whether for the winter-feeding, besides the improved or increased quantity of hay, larger quantities of juicy food (mangolds, turnips, etc.) will not also be necessary. If you give better quality hay you must also feed larger quantities of roots to balance things and provide bulk.

As, therefore, the principles of winter feeding are not unaffected by an intensive manuring of the grass-land they are discussed below according to the experience obtained at Hohenheim.

The basis of the winter-feeding is the fibrous food (hay, etc.) and the roots. The first is necessary in order to keep the ruminating functions normal, and the second in order to act upon the milk-producing animals in a similar manner as the pasture is doing in summer, especially on account of the vegetable water and vitamines. The more foodstuffs that can be supplied in this way, and the more easily these foodstuffs can be utilised by the stock, the higher is the yield which will be obtained from foods grown on the farm (*Wirtschaftsgrund-futter*). Therefore the winter-feeding at Hohenheim is based approximately upon the following scheme for about 500 kilos (1,100 lb.) of living weight :—

Cows with more than 10 litres (2⅛ galls.) of milk :—

7½	kilos of the very best hay	(16½ lb.)
5	„ „ straw	(11 „)
50	„ „ turnips	(110 „)

Cows with less than 10 litres (2½ galls.) of milk :—
5 kilos of good hay (11 lb.)
7½ ,, ,, straw (16½ ,,)
35 ,, ,, turnips (77 ,,)
Cows giving no milk (*trockenstehend*) and store stock :—
2½ kilos of inferior hay (5½ lb.)
10 ,, ,, straw (22 ,,)
20 ,, ,, turnips (44 ,,)

In addition to this food basis the cattle of the first class got a quantity of oilcake, which represents the equivalent of the extra-production in milk. 60 to 70 grams of digestible albuminoids are given in the form of oilcake for every additional litre (¼ gall.) (2·2 lb.) of milk. In this way an extremely cheap and at the same time large milk-production has been secured.

If care is further taken that as many animals as possible calve in the period between October and December, the winter production of milk will be extraordinarily abundant and cheap, and the total annual production especially high, owing to the fact that the animals are given the very strong stimulus of being on the grass at a time when lactation has not proceeded too far, and will therefore yield relatively high results in milk.

With the mountain cattle of South Germany (*suddeutsches Hovenvieh*) it has in this manner been possible to obtain a milk production of over 3,000 litres (660 galls.) on an extraordinarily small expense of concentrated foods (*Kraftfutter*).

The requisite amount of roots was secured by doubling the crop and bringing it up to 1,000–1,200 Dz. per hectare (40–48 tons per acre) by means of abundant manuring. Such high mangold and turnip crops are harvested with considerably less work and cost per ton as compared with smaller crops.

Scheme of Manuring

The method of manuring the pastures at Hohenheim is as follows :—

At the beginning of the treatment the land receives :—

per hectare { 40 kilos P_2O_5 36 lb. / 80 to 100 ,, K_2O 70–90 ,, / 120 ,, N 107 ,, } per acre.

(600 kilos sulphate of ammonia) (5 cwt. sulphate of ammonia)

The P_2O_5 may be applied as basic slag, superphosphate or other form of phosphate, the K_2O is usually applied as 40 per cent. potash salts and the N as sulphate of ammonia. The potash phosphates and half the total quantity of sulphate of ammonia (*i.e.*, 300 kilos of sulphate of ammonia) are given in the winter. The remaining sulphate of ammonia (300 kilos) is divided up into two or three top dressings during May, June, and July. The above dressing is for the first year of the treatment. In the following years the P_2O_5 and the K_2O are reduced each year, but the amount of nitrogen given as sulphate of ammonia is not reduced.

It is, of course, necessary that the lime content of the soil under this treatment should be carefully maintained.

New Dyestuffs from Para-phenylenediamine

A SERIES of new dyestuffs has been announced obtained by combining the diazo compound of the 2 : 6-disulphonic acid of para-phenylenediamine with a phenol-ortho-carboxylic acid, such as salicylic acid or cresotinic acid. The new products are described by Carl Heidenreich (Bayer and Co.), of Germany, in *U.S. Patent* 1,474,587. The dyestuffs are prepared in the form of their sodium salts and in the dry state consist of greyish yellow to violet powders, soluble in water and with a yellowish coloration. The products are useful for printing on cotton in connection with chromium acetate mordant and furnish pure greenish yellow colours fast to soaping and chlorine bleaching. When employed in connection with Methylene Blue they furnish valuable green pigments which have considerable fastness to light. When the solution of the dye is treated with tin and hydrochloric acid the compound is readily split up.

X-Ray Spectrography

THE use of X-rays is already of great importance to the chemist and metallurgist. X-ray crystal analysis has enabled considerable research in alloys, and also facilitated the identification of new constituents in agglomerates. Because of its many uses the pamphlet on "Applications of X-ray Spectrography and Crystallography to Metallurgy and to Chemical Problems," just issued by Adam Hilger, Ltd., of 75A, Camden Road, London, will be of interest. It covers recent applications of the science, and includes an interesting bibliography.

The Russian Chemical Industry

Activity of the General Chemical Trust

THE Russian economic newspapers from time to time now contain reports concerning the activity of various industries, including the chemical branch. In connection with the latter Professor V. P. Kravetz, senior director of the General Chemical Trust, has just given to a representative of the official Moscow *Ekon. Sjisn* ("Economic Life") a survey of the situation of the Trust's activities in the first half of the fiscal year ended March 31, 1925, which is published in that newspaper on May 5.

It appears from the statements of the director that the scheduled programme in the half-year in question was exceeded by from 10 to 20 per cent. in general, although there was a deficiency in this respect in regard to the basic and timber extract branches, which showed a lower production of from 10 to 15 per cent. as compared with the pre-determined programme. The total actual production of the Chemical Trust in the half-year represented a value of over 119,000,000 roubles, or 50 per cent. more than in the corresponding half-year in 1923–24. In connection with this improvement it is mentioned that the load on the works (degree of activity) was brought up to 75 per cent. of the output capacity of the works in general, while in individual cases the load exceeded that in 1913.

In order partly to meet the case of the depreciated plant a sum of 3,500,000 roubles was expended during the half-year on works of reconstruction and repair at the works, and the outlay of a further sum of 9,500,000 roubles is demanded for the same purpose in the current half-year. Taken altogether the sums required for works of restoration in the fiscal year, which ends with September next, represent 12 per cent. of the basis capital of the chemical industry. In particular a large expenditure is needed for such operations in connection with the basic branches, aniline dyes, varnishes and chemical-pharmaceutical branches.

After mentioning that the productivity of labour improved during the half-year and that new branches of production were embarked on and the working of processes was simplified, the director states that despite the fact that the coefficient of increase in the costs of turning out a number of products has been brought down to 1·2 as compared with 1913, most of the chemical products are still very dear, and this circumstance is reflected in the prime costs of the State undertakings, which are customers of the Chemical Trust.

The sale of products in the half-year under consideration is said to have reached record figures in so far as concern present conditions. The total turnover represented a value of 112,000,000 roubles, or almost 95 per cent. of the output in that period, while in the case of acetic acid, acetone, and litharge there was a great scarcity in the market.

The exports of various chemical products in the half-year amounted to 6,915 tons, whereas the total exports in the calendar year of 1924 only reached 7,366 tons.

The growth in the sales of chemical products in the six months ended with March, 1925, is claimed to have strengthened the financial position of the industry in some branches, while in others the financial situation is strained. The latter applies in particular to the basic chemical branches, where the turnover of capital is slow on the one hand and on the other considerable funds are required for the acquisition of raw materials and the execution of works of reconstruction.

Addressing the third conference of the congress of the Soviets, held recently in Moscow, Mr. F. E. Dzerjinsky, National Commissioner, referred to the situation of the chemical industry of Russia. As compared with the pre-war period he stated that the production of chemical products amounted to 19·3 per cent. in 1921-22, 29·6 per cent. in 1922-23, and 48·2 per cent. in 1923-24, while the output in the first half of the current year (1924-25) reached 58.7 per cent. of the production in 1912, which represented a value of £5,200,000.

Industrial Alcohol from Molasses

HERBERT GREEN AND CO., LTD., are extending their works at Salt End, Hull, and erecting additional steel tanks for storing molasses, giving a capacity of 18,000 tons.

Chemical Matters in Parliament

Exported Spirits Allowances

The Financial Secretary to the Treasury (Mr. Guinness) (House of Commons, May 20), in reply to a question, said that no bounty was paid on spirits exported from this country, but export allowances of 3d. per proof gallon on British plain spirits, mineralised methylated spirits, and rectified spirits of wine, and of 5d. per proof gallon on British compounded spirits were paid as compensation for the enhanced cost of manufacture due to Revenue restrictions. The total amount of such allowances paid during the year ended March 31, 1925, was £114,566. Separate particulars of the quantity of spirits exported to the United States, and the amount of the allowances paid on such spirits were not available. The quantities of potable spirits of British origin and manufacture exported from Great Britain and Northern Ireland during the calendar years 1923 and 1924 and during the period January 1 to April 30, 1925, were 7,223,848, 8,534,492, and 2,865,552 proof gallons respectively.

Gas Masks for Formaldehyde

Colonel Day (House of Commons, May 20) asked the Home Secretary whether he was aware that the evidence given by Professor McFall, at a Liverpool inquest, on Jeremiah Meggs, who was manager of the Government disinfecting station, showed the gas masks in use for the disinfecting operations of formaldehyde to be inefficient; and if steps would be immediately taken to safeguard the lives of men employed on such tasks.

Mr. Locker-Lampson said that he had seen the evidence. Professor McFall appeared to have been referring to some gas masks without face pieces, which he had seen at the station. These were not used, however, where there was serious exposure to formaldehyde vapour, as, for example, when entering the formaldehyde chamber, but for work in the neighbourhood of the machines, for which purpose he was advised they were efficient. A suitable type of mask for entering the chamber was provided. The protection of the workmen against the effect of fumes received constant attention. The death of the manager was found to be the result of kidney disease of long standing.

Scientific Research Control

The Prime Minister (House of Commons, May 21), in reply to a question, said that the Lord President of the Council had no responsibility for ensuring adequate co-ordination in respect of the whole of the expenditure for scientific research, which was estimated for 1925–26 to exceed £4,000,000, but the Department of Scientific and Industrial Research and the Medical Research Council, for whose activities the Lord President was responsible, was, so far as the first-named Department was concerned, provided with machinery for the co-ordination of the research work of the technical establishments of the fighting services which has a civilian interest and of certain other Government Departments. The Department had no control over the work of the research establishments maintained by other Government Departments, and had no responsibility in connection with research undertaken purely for defence purposes. Conferences between representatives of the Department of Scientific and Industrial Research, the Medical Research Council, and the Development Commission were held periodically for the consideration of matters of common interest.

Palm Oil Industry

Lieut.-Commander Kenworthy (House of Commons, May 25) asked the Secretary of State for the Colonies whether the Government had considered the Report on the position of the palm oil and palm kernel industry of West Africa; whether it was proposed to take any action upon the recommendations in the direction of attempting to transfer the extraction and refining of palm oil from this country to West Africa; and whether, before any such steps were taken, opportunity would be given for discussing the subject.

Mr. Ormsby-Gore said that he could not consider the matter before he had received a full statement of the views of the Governors of the Dependencies concerned.

Low-Temperature Carbonisation

The Secretary for Mines (Colonel Lane-Fox) (House of Commons, May 26), in reply to a question, said that he was advised by the Department of Scientific and Industrial Research that the products obtained by the low-temperature distillation of one ton of coal, when the process was carried out in externally-heated retorts at a temperature of about 600° C., were roughly as follow, though they varied with the different seams of coal and with the type of plant employed:—

14 cwt. of smokeless fuel.

30 to 40 therms of gas of calorific value varying from 700 to 1,000 British thermal units per cubic foot.

12 to 19 gallons of crude oil.

2 to 3 gallons of crude motor spirit.

That was the result of the experiment at the Fuel Research Station at Greenwich.

Fuel Oil and Motor Spirit Imports

Mr. A. M. Samuel (Secretary, Overseas Trade Department) (House of Commons, May 26), in reply to a question, said that the imports of fuel oil into Great Britain and Northern Ireland during 1924 amounted to 385,582,000 gallons, valued at £5,603,600; and of motor spirit to 422,311,000 gallons, valued at £17,846,500. The average declared value of the fuel oil imported was 3·49 pence per gallon, and of the motor spirit imported, 10·14 pence per gallon.

Demand for Nitrogenous Fertilisers

Mr. C. A. Huni, speaking at the annual general meeting of Aguas Blancas Nitrate Co., Ltd., on Friday, May 22, said that the general position of the nitrate industry during the year had been quite satisfactory, and consumption for the year ending June 30 was estimated to be 1,175,000 tons for Europe and Egypt, 1,075,000 tons for the United States, and 125,000 tons for other countries, compared with 1,104,000 tons, 937,000 tons and 152,000 tons for the previous year. Those figures would have been better had it not been for the competition from synthetic nitrogen products in some of the European countries, particularly in Germany, Holland and Scandinavia, and also in Japan, where sulphate of ammonia had largely displaced Chilean nitrate. There had undoubtedly been a large increase in the consumption of nitrogenous fertilisers, and, in his opinion, that was bound to continue. It was essential to cheapen costs of Chilean nitrate, both by way of more economical production and by way of reduction of export duty. The new season had started quite auspiciously; there had already been contracts entered into between buyers and the association for over 620,000 tons for June to December shipment, even before selling prices had been fixed.

Quarry Workers' Wages

During the past few months there has been considerable unrest among the limestone quarry workers in the Buxton district. Mr. T. Hartle, who deals with this section of the National Union of the General and Municipal Workers' Union, states that a settlement has now been almost reached.

The majority of the workers are employed by the Buxton Lime Workers' Co., who are associated with Brunner, Mond and Co., Ltd. The arranged settlement includes all the workers of Brunner, Mond and Co., Ltd., and Taylor, Frith and Co. The labourers' wages have been advanced to a minimum rate of 1s. 0¼d. per hour and workmen in the transport department to 1s. 1½d. per hour. A production bonus scheme has also been adopted which it is anticipated will produce an average increase in wages of from 5 per cent. to 7½ per cent. for all classes of workers employed by the firms who are parties to the settlement. About 1,700 workers are affected.

Death of Sir W. F. Barrett, F.R.S.

The death is announced, in his eighty-second year, of Sir William Fletcher Barrett, F.R.S., chief founder and an ex-president of the Society of Psychical Research. At nineteen years of age, he became an assistant to Professor Tyndall. He was subsequently Lecturer on Physics at the Royal School of Naval Architecture, and for nearly forty years Professor of Physics at the Royal College of Science, Dublin. He was a Fellow of the Royal Societies of London, Edinburgh and Dublin, and was the author of a large number of scientific publications. In 1899, he announced the discovery of the electrical and magnetic properties of a silicon-iron alloy, now known as Stallory, which has come widely into use for the construction of transformers, dynamos, etc. He was knighted in 1912.

From Week to Week

A CHAIR OF BACTERIOLOGY is to be founded at Aberdeen University.

SIR AUCKLAND GEDDES has been elected Chairman of Rio Tinto Co. in succession to the late Lord Milner.

A 2S. REDUCTION IN the price of Chilean nitrate is advocated in some quarters, so as to compete with artificial manures.

THE FELLOWSHIP IN CHEMISTRY offered by the Society of American Field Service Fellowships for French Universities has, for 1925-26, been awarded to Mr. Chandler D. Ingersole.

TO PREVENT EXTENSIVE DUMPING OF AFFECTED GOODS the National Union of Manufacturers is urging the Government to bring the silk duties into operation as soon as possible, and not later than June 1.

AN ILLUMINATED ADDRESS and £50 in Savings Certificates have been presented to Mr. W. Harvey, who has completed 50 years in the service of T. H. Harris and Sons, Ltd., soap manufacturers, of Stratford, London.

DR. S. C. LIND has been transferred from the position of chief chemist of the Bureau of Mines to the position of associate director of the Fixed Nitrogen Research Laboratory, U.S. Department of Agriculture. Dr. Lind accepted an appointment in the Bureau of Mines in 1913.

THE GERMAN NITROGEN SYNDICATE has fixed its prices for the commercial year beginning June 1 and they are somewhat lower than those at present in force. Two new fertilisers are stated to have been placed on the market for the first time, and high claims are made for them.

ON Monday next the registered office of Tehidy Minerals, Ltd., will be removed to 14, Basset Street, Camborne, Cornwall, and on and after that date all communications should be sent to the company at the new address. The new telephone number is "Camborne 120."

THE AMENDED SILK DUTIES have called forth the statement from British Celanese, Ltd., that the concessions either reduced to a minimum or tended to counterbalance the harmful effect of the original proposals. They would not feel justified in refusing to accept them or in placing any difficulties in the way of their acceptance.

REPORTS STATE THAT Herr Diehm, managing director of the German Potash Syndicate, with another director, Herr Kunze, has left for America for discussions with the Potash Importing Corporation of New York. Herr Rechberg is also visiting America, and the managing director of the Société Commerciale des Potasses d'Alsace is also expected in New York.

A STATEMENT that Germany was prepared to sign an international convention prohibiting the use of poisonous gases in warfare was made by a German delegate at the General Arms Committee, Technical Section, on Monday. On Wednesday it was decided to arrange a representative conference to discriminate between gases for commercial purposes and for warfare purposes.

TRADE WAS NOT HELPED by the policy pursued by the Lancashire trusts such as the Calico Printers' Association, the Bleachers' Association and the Bradford Dyers' Association, said Mr. S. Finburgh, speaking on the prevention of unemployment in the House of Commons last week. These trusts, Mr. Finburgh stated, employed their workers for only three days in the week to keep prices up, turning the workers on the dole for the rest of the week.

TERMS OF SETTLEMENT were announced to Mr. Justice Tomlin in the Chancery Division on Friday, May 22, in the action, Naamlooze Vennootschap Asphaltfabrik Voorheen Firma Stein & Takken against Matthew Herrod, of Wisbech. Plaintiffs sought to restrain an alleged infringement of their trade mark "Carbokrimp" for an insecticide wash. The defendant undertook to discontinue the use of the word "Carbokill" for a similar article, and not to use the syllables "Carbo" or any syllables only colourably different from theirs, and he would pay £100 towards plaintiffs' costs.

APPLICATIONS ARE INVITED for the post of Demonstrator in Inorganic and Physical Chemistry at Bedford College, Regent's Park, London, N.W.1—Secretary, by June 3; Assistant Lecturer in Physics, Leeds University—Registrar, by June 15; Demonstrator in Chemistry, School of Medicine for Women, Hunter Street, London, W.C.1—Warden and Secretary, by June 6; Professor in Organic Chemistry, Witwatersrand University, Johannesburg—Secretary, Office of the High Commissioner for South Africa, Trafalgar Square, London, W.C., by July 15; Chemistry Master, Taunton School—The Headmaster.

A REDUCTION IN THE CUSTOMS DUTY on natural silk is officially announced, and the excise duties on artificial yarn and waste are being reduced from 2s. 6d. to 1s. and 6d. per lb. respectively. The Customs duty upon singles yarn will be 2s. per lb., upon waste 1s. per lb., and upon doubled or twisted thread, 3s. per lb. The Customs duty upon imported artificial silk tissue remains at 3s. 6d. per lb. The Customs duty upon made-up articles is to be reduced from 33⅓ per cent. to 10 per cent. where the value of silk or artificial silk component does not exceed 20 per cent. of the value of the article and to 2 per cent. where it does not exceed 5 per cent.

AN EXTENSIVE SEWERAGE SCHEME is to be carried out by Knutsford (Cheshire) Council at a cost of £61,500.

THREE MEN WERE TEMPORARILY GASSED by ammonia from a refrigerator at Longford's Dairies, Ltd., Nottingham, on Monday.

THE MINERAL RESOURCES OF CANADA, 1923, is the subject of a report now available and obtainable from the High Commissioner for Canada, Kinnaird House, Pall Mall East, London, S.W.1.

APPLICATIONS FOR GRANTS from the Chemical Society Research Fund must be made to the Assistant Secretary, Burlington House, Piccadilly, London, W.1, by June 1 on a special form to be had on application.

A SHORT COURSE ON REINFORCED CONCRETE DESIGN to be given during the summer term by Mr. D. S. Stewart, B.Sc., and open to non-graduating students, has been approved by the Court of Edinburgh University.

EXTENSIVE SUGAR REFINING PLANT will be sold by auction on Tuesday, June 9, at 11 a.m. at 77, Burlington Road, Liverpool. It is the property of George Jager and Sons, Ltd., sugar refiners, who are removing to new premises.

FOR HARBOURING UNCUSTOMED SACCHARINE Abraham de Rooy, traveller, and David Hartog, commission agent, were at Old Street Police Court, London, on Friday, May 22, ordered to pay £2,500 each or to undergo six months' imprisonment. The saccharine was found in rolls of paper. Marcus van Gigh and Garnet Gelkoff were discharged.

APPLICATIONS FOR RESEARCH SCHOLARSHIPS IN AGRICULTURAL and veterinary science are invited by the Ministry of Agriculture. The scholarships are tenable for three years from October, 1925, and are valued at £200 a year. Applications, on form 900/T.G., obtainable from the secretary of the Ministry, 10, Whitehall Place, London, S.W.1, must be returned by June 30.

THE U.S. GOVERNMENT are to appeal to the Supreme Court against the decision in the Chemical Foundation Patents case. The contention is that the sale of more than 5,000 seized German dye and chemical patents to the Chemical Foundation by the Alien Property Custodian for approximately $250,000 was illegal, that there was no authority, and that the price was inadequate.

AN AWARD OF RAMSAY MEMORIAL FELLOWSHIPS for research in chemistry will take place at the end of June. One Fellowship of the value of £300, open to graduates of all British Universities, and one Fellowship of the same value for Glasgow graduates will be awarded. Full particulars and forms of application can be obtained from Dr. Walter Seton, Ramsay Memorial Fellowship Trust, University College, London, Gower Street, London, W.C.1, and should be returned by June 6.

LOW TEMPERATURE CARBONISATION was discussed at a meeting of the Manchester District Institute of Gas Engineers, at Harrogate. Sir Dugald Clerk, F.R.S., referring to the Gravesend experiments said it had been found that at the original price of coal the process could not be made to pay. Another point of importance was that the oils and tar obtained by low temperature carbonisation did not survive. Mr. J. H. Ellis, president of the British Commercial Gas Association, said that any attempt by the Government to make a success of something which was not a commercial success would be Socialistic speculation.

SPEAKING AT THE GENERAL MEETING of the British Cotton and Wool Dyers' Association at Manchester on Thursday, May 21, Mr. A. Hoegger welcomed with great satisfaction the appointment of Dr. E. F. Armstrong as managing director of the British Dyestuffs Corporation. He mentioned that Mr. Ernest Holdsworth was on a world tour to investigate the conditions affecting the thirty-five branches of the Association and to gain a better understanding of the growing competition. By the end of the year he would have visited China, Japan, Canada, India, Burmah, Siam, Singapore, Australia, South America, and the United States.

Obituary

MR. GEORGE RUSSELL, aged 44, oil and colour merchant, of Braintree, Essex. He accidentally swallowed a piece of metal.

MAJOR JOHN H. DICKINSON, for nearly 40 years connected with the Pilkington Glass Works, St. Helens, aged 83.

DR. GUILFORD LAWSON SPENCER, a noted sugar chemist and the first chemist to take charge of a sugar factory in Louisiana, U.S.A. He held an appointment with the U.S. Division of Chemistry and was author of two well-known books—*A Handbook for Cane Sugar Manufacturers and their Chemists*, and *A Handbook for Beet Sugar Chemists*. He was in his 67th year.

MR. EDWARD G. PROULX, state chemist and seed commissioner for Indiana, aged 45.

DR. DAVID T. DAY, for several years consulting chemist to the U.S. Geographical Survey and the Bureau of Mines. He was an authority on petroleum and was for some years in charge of petroleum investigations. Aged 66.

MR. H. S. ROWE, for many years on the chemical staff of Lever Brothers, Ltd., Port Sunlight.

MR. J. S. KIRKWOOD, for 55 years with R. and J. Garroway, Netherfield Chemical Works, Glasgow.

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Abstracts of Complete Specifications

232,653. Insoluble Metal Compounds for Use Particularly as Pigments, Production of. J. Bedford, 9, Market Place, Sleaford, Lincoln. Application date, December 19, 1923.

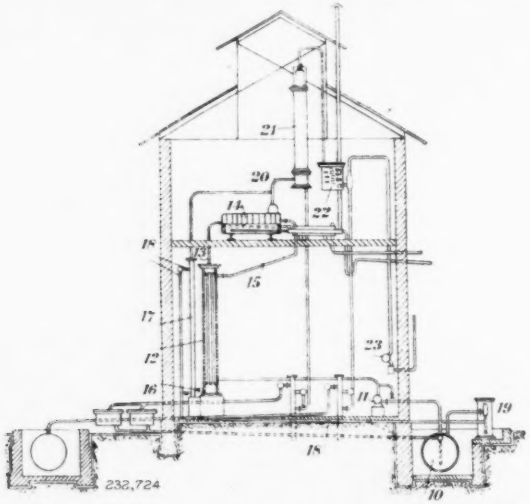
The process is based upon the fact that the addition in the solid state of a metal salt which is readily soluble in water, to a boiling solution of a salt will yield a precipitate of the insoluble metal compound which forms the pigment, in a very voluminous form. This precipitate is readily separated by filtering and is particularly suitable for use as pigment. In an example, lead acetate in the solid state is added in small quantities at a time to a 5 per cent. solution of sodium carbonate heated to boiling point, until the molecular equivalent of lead acetate has been added. A white pigment is obtained which is a substitute for the ordinary white lead. A white pigment may also be formed in a similar manner by adding solid zinc sulphate to boiling sodium carbonate solution. Pigments may also be obtained from salts of copper, cobalt, barium, or titanium.

232,680. Titanium Oxide, Production of a Special Form of. A. L. Mond, London. From Metal and Thermit Corporation, 120, Broadway, New York. Application date, January 23, 1924.

It has been found that if titanium dioxide or rutile is calcined in a neutral or non-oxidising atmosphere it gradually becomes black or grey-black, and undergoes a change in specific heat, heat conductivity, and electric conductivity. The material, preferably rutile, is ground and heated to a temperature below fusion, and it is found that the more reducing the atmosphere the lower the temperature at which the above change takes place, while at high temperatures the conversion takes place in a neutral atmosphere. The operation may be effected in a gas or oil-fired furnace heated to 800°–1000° C. The calcined rutile may be made into various articles with or without a binder. The product is a good conductor of heat and electricity, and may be made into electrodes, conductors, containers, etc., for use with chemicals which would adversely affect metallic conductors.

232,724. Liquid Hydrocarbons of the Benzol Type, Method and Apparatus for Continuously Distilling. Koppers Coke Oven Co., Ltd., 301, Glossop Road, Sheffield. From H. Koppers, 29, Moltkestrasse, Essen, Germany. Application date, February 9, 1924.

When the oil to be distilled is raised by means of a vacuum from the oil container to the still, the working of the apparatus

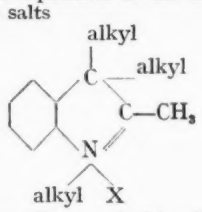


is largely dependent on the regular maintenance of the vacuum. In this invention a vacuum is employed which normally ensures a flow of liquid to the still at the proper rate, and in addition a uniformly working pump is used which is capable of delivering the oil at the required rate to the still. When the vacuum is applied, the pump is only relieved of load, but the delivery of oil to the still is not altered. If the vacuum fails, the load is taken up by the pump.

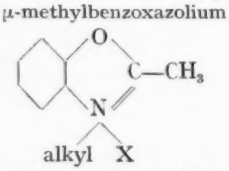
Oil saturated with benzol passes from a container 10 to a pump 11, and thence to one side of a heat exchange apparatus 12, where it is preheated. The oil then flows through a pipe 15 to the still 16, and back through a pipe 13 to the other side of the heat exchanger 12 to heat the incoming oil. The oil then passes to a stand pipe 17 with an overflow 18 leading to a cooler 19 connected to the container 10. The vapour passes through a pipe 20 to a rectifying column 21 and cooler 22. A partial vacuum is maintained in the still 10, column 21, cooler 22, by a vacuum pump 23. The pump 11 forces oil at a constant rate through the still, which is not affected by the vacuum. Any fluctuations affect only the overflow 18. As there is no risk of accidental emptying of the still through failure of the vacuum, the still may be heated by gas burners.

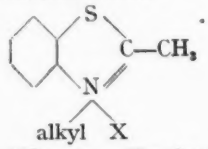
232,740. Polymethine Dyestuffs, Manufacture of. W. Carpmael, London. From Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. Application date, March 11, 1924.

In this invention an orthoformic ester, *e.g.*, $HC(OC_2H_5)_3$ or a salt of formic acid or β-alkoxy-acrolein-acetal is condensed with a cyclammonium salt containing a reactive methyl group in the α-position to the nitrogen, *e.g.*, the α-methylindoleninium salts

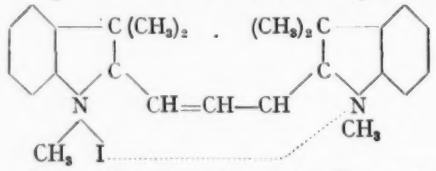


the μ-methylbenzoxazolium and thiazolium salts





where X is Cl, Br, I, SO_4H, ClO_4, NO_3, etc. The dyestuffs are dark crystalline powders soluble in water. In an example, the methyl iodide of α-β-β-trimethylindolenine is dissolved in acetic anhydride and treated with orthoformic ethyl ester under a reflux condenser. The resulting dye is soluble in hot water and in alcohol with a greenish fluorescence. α-β-β-trimethylindolenium compounds of the naphthalene series are obtained by converting β-naphthylamine into its hydrazine, condensing with acetone, melting the product with zinc chloride to obtain the indol, and treating the products with alkylising agents whereby three alkyl groups are introduced. The probable formula of the above dyestuff is



232,742. Acid and Chemical-proof Structures for Electrolytic, Metallurgical and Chemical Operations. The Consolidating Mining and Smelting Co., Ltd., Drummond Building, St. Catherine Street, Montreal, Canada. F. S. Willis and B. A. Stimmel, Smelter Hill, Trail, B.C., Canada. Application date, March 12, 1924.

The object is to provide an acid-proof coating for concrete floors, metal structures, metal or concrete tanks, launders, pipes, pipe connections, etc., used in metallurgical, electrolytic and chemical plant. The coating consists of sulphur 30–40 per cent. and sand 70–60 per cent. The sulphur is melted and the sand added, and the temperature then increased to about 150° C., when the mixture becomes thicker and may be plastered on the surface to be rendered acid-proof, or cast in moulds. The composition contracts considerably on

cooling, and the moulding is assisted by tamping. If the composition is to withstand hydrofluoric and hydrofluosilicic acids, fluorspar sand is used instead of silica sand. The coating should be $\frac{1}{8}$ to 1 in. in thickness.

232,799. Black Vat Dyestuffs, Manufacture of. J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, May 24, 1924.

Vat dyestuffs are obtained by treating nitrated dibenzanthrone with sulphur or an agent capable of supplying sulphur, with or without suitable transporters such as copper oxide or antimony trisulphide. Better results are obtained by using purified nitro-benzanthrone prepared as described in Specification No. 220,212 (see The Chemical Age, Vol. XI, p. 270) by fractional precipitation from its solution in concentrated sulphuric acid. This product is heated with sulphur and copper oxide to 240°–250° C., until a sample extracted with sodium sulphide solution shows no increase in the depth of the colour. The mixture is then cooled, powdered, and boiled with sodium sulphide to remove unaltered sulphur. The dyestuff is soluble in concentrated sulphuric acid, and in trichlorbenzene, giving a reddish-violet solution. Cotton is dyed blue, turning black on exposure to air. A mixture of sulphur and sodium sulphide may be employed instead of sulphur.

232,834. Hydrocyanic Acid, Process for Producing. Deutsche Gold-und Silber Scheideanstalt vorm. Roessler and O. Liebknecht, 7–9, Weissfrauenstrasse, Frankfurt-on-Main, Germany. Application date, August 1, 1924.

It has been found that highly porous substances such as activated charcoal together with liquids which are capable of absorbing hydrocyanic acid, will selectively absorb the acid from other gases. The acid may then be recovered from the charcoal by evaporation. The charcoal may be treated with water or preferably with acid substances which are capable of absorbing hydrocyanic acid, and the charcoal may then be charged with hydrocyanic acid up to 150 per cent. of its weight. The acidification of the charcoal may be effected with acid gases, vapours, or liquids.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention: 208,715 (Aluminum Co. of America) relating to production of aluminium, see Vol. X, p. 20 (Metallurgical Section); 210,434 (Soc. Nationale d'Industrie Chimique en Belgique Soc. Anon.) relating to alkali sulphides and sulphhydrates, see Vol X, p. 363; 215,007 (Soc. of Chemical Industry in Basle) relating to arylidoquinones, see Vol. XI, p. 17; 216,130 and 218,628 (H. Muller-Clemm and Ges. fur Chemische Produktion) relating to active declorising charcoal, see Vol. XI, p. 102 and 245; 218,615 (Ricard Alleret et Cie) relating to normal butyl alcohol, see Vol. XI, p. 245; 218,662 (Distilleries des Deux-Sèvres) relating to absolute alcohol, see Vol. XI, p. 270; 219,653 (Soc. of Chemical Industry in Basle) relating to substantive azo dyestuffs, see Vol. XI, p. 331; 224,913 (Sharp and Dohme Inc.) relating to alkyl resorcinols, see Vol. XII, p. 86; 225,552 (Metallbank und Metallurgische Ges. Akt.-Ges. und W. Gensecke) relating to distillation of fatty acids, glycerine, etc., see Vol. XII, p. 117; 228,863 (Soc. Chimique des Usines du Rhône) relating to malonic acid esters, see Vol. XII, p. 382.

International Specifications not yet Accepted

230,796. Fertilisers; Ammonium Magnesium Carbonate. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude, 48, Rue St. Lazare, Paris. Assignees of Soc. Chimique de la Grande Paroisse (Azote et Produits Chimiques), 13, Rue des Saussaies, Paris. International Convention date, March 13, 1924. Addition to 210,399.

Specification 210,399 (see The Chemical Age, Vol. X., p. 334) describes the production of sodium bicarbonate and a fertilizer containing potassium chloride and ammonium chloride by using sylvinite instead of sodium chloride in the ammonia-soda process. In this invention, sylvinite is replaced by carnallite, kainite or schoenite, containing magnesium salts. When sodium bicarbonate is precipitated and removed, some of the mineral is added and the mixture treated with ammonia and carbon dioxide to precipitate ammonium magnesium carbonate. The double carbonate may be recovered separately, or with the mixture of potassium chloride, potassium sulphate, ammonium chloride and ammonium sulphate. These products are suitable for use as fertilisers.

230,851. Paints. Subox Akt.-Ges. Electro-Chemische Fabrik, 187, Langstrasse, Zurich, Switzerland. International Convention date, March 13, 1924.

A paint is composed of cuprous oxide and linseed or other drying oil which will reduce the oxide to metallic copper. The surface can be brushed to give a bright coppered effect.

230,855. Anhydrides of Disaccharides. A. Pictet, Geneva, Switzerland. International Convention date, March 14, 1924.

Disaccharides are heated up to 190° C. at reduced pressure to obtain the anhydrides. Saccharosane and disaccharosane are prepared from saccharose, and lactosane from lactose.

230,861. Artificial Resins. C. Kulas and J. Scheiber, 24, Luppenstrasse, Lindenau, Leipzig, Germany. International Convention date, March 17, 1924.

Phenol-aldehyde condensation products are concentrated when in the liquid state by atomising them or distributing them on rollers or belts, and heating.

230,872. Synthetic Tanning Agents. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, January 9, 1923.

Tanning agents are obtained by treating phenols with sulphur chloride and then with an alkali sulphate in presence of air, oxygen, hydrogen peroxide, etc. The product is precipitated by acidifying and salting out.

231,134. Ammonia, Carbon Monoxide, and Hydrocyanic Acid. Norsk Hydro-Elektrisk Kvaelstofaktieselskab 7, Solligaten, Oslo, Norway. International Convention date, March 21, 1924.

Gases containing hydrocyanic acid and hydrogen are catalytically converted into ammonia and carbon monoxide by reaction with water produced in situ by the addition of air. After absorption of ammonia, the gases may be mixed with hydrocarbons or carbonaceous material and hydrogen, and blown through an electric arc to produce hydrocyanic acid. Hydrogen may have to be added for the subsequent conversion into ammonia.

231,147. Alkali Aluminates. Salzwerk Heilbronn Akt.-Ges., T. Lichtenberger, and K. Flor, Heilbronn-on-Necker, Germany. International Convention date, March 19, 1924.

A mixture of sodium chloride 6 molecular parts, and alumina 1 molecular part is treated with steam at 500°–600° C. in the presence of a catalyst such as a salt of manganese, copper, chromium or magnesium. Hydrochloric acid is evolved, and a porous aluminate obtained which may be treated with carbon dioxide to obtain alumina and sodium carbonate. The alumina is used for a repetition of the cycle.

231,149. Intermediate Products. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, March 20, 1924.

1 : 8-naphthsultone is sulphonated with fuming sulphuric acid, nitric acid added, and the sodium salt of the 1 : 8-naphthsultone-2-nitro-4-sulphonic acid is obtained by salting out. This is treated with concentrated ammonia to obtain the 2-nitro-1-oxynaphthalene-8-sulphonamide-4-sulphonic acid, which may be reduced with iron and sodium bisulphite to obtain 2-amino-1-oxynaphthalene-8-sulphonamide-4-sulphonic acid. The diazo compound of the latter may be coupled with the usual components, yielding mordant dyestuffs which may be converted into soluble metal compounds by treating with an agent yielding a metal, such as a chromium or copper compound. In an example, the diazo compound is coupled with β-naphthol, and the dyestuff boiled with chromium fluoride. Other components employed are α-naphthol, 5 : 8-dichlor-1-naphthol, 2 : 3-oxynaphthoic acid, 3-oxy-1-8-naphthalene-dicarboxylic acid, 1 : 4- and 2 : 6-naphthol sulphonic acids, resorcylic acid, resorcin, and 1-phenyl-3-methyl-5-pyrazolone, and the 3^1-sulphamido-3^1-nitro, and 4^1-oxy-3^1-carboxy-derivatives.

231,150. Synthetic Drugs. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, March 21, 1924.

Barbituric acids substituted in the C.C. position with an unsaturated alicyclic group and a saturated or unsaturated aliphatic group are prepared from the corresponding disubstituted malonic acid or cyanacetic acid, or by introducing

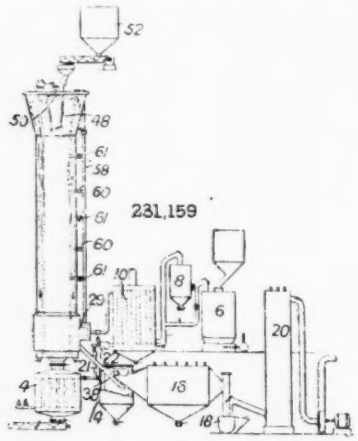
one of the groups into a barbituric acid substituted with respect to the other group, or into an intermediate product for the preparation of the barbituric acids, and converting the intermediate product into a barbituric acid. Some examples are given.

231,157. Obtaining Hydrocarbon Liquids and Gases. Benzonaftène, 7, Via Meravigli, Milan, Italy. International Convention date, March 24, 1924.

Fuel oils, and other heavy oils and fats, which may be animal, vegetable or mineral, are heated with cerium oxide and reduced copper to 450°–600° C., and then with thorium oxide and reduced nickel at the same temperature. A hydrocarbon liquid is condensed from the vapour by cooling to 30° C., and the remaining vapour is treated with iron oxide and reduced nickel heated to 200° C. A further condensate is then obtained at 15° C., and the remaining vapour is treated with iron oxide and reduced iron at 250°–300° C. Another condensate is obtained at 10° C. and the remaining gas is used for lighting and heating.

231,159. Carbonizing Coal. International Combustion Engineering Corporation, 43, Broad Street, New York. Assignees of W. Runge, Orange, N.J., U.S.A. International Convention date, March 21, 1924.

Powdered coal is supplied from a hopper 52 to a vertical retort having a fan 50 at the top. Hot gas passes from a producer 6 to a dust remover 8 and heater 10, and then to a chamber 29 at the bottom of the retort. The hot gas rises through the falling coal, and the gas and vapour pass into a



jacket surrounding the retort to deposit dust, then through pipe 38 to a dust separator 14 and washer 16, and finally to a hydraulic main 18 and condenser 20. The residue passes into a chamber 4 where it preheats the air supplied to the burners 22 of the heater 10 and also to the jacket of the separator 14 to prevent condensation. The hot gas is passed into the retort jacket through a pipe 58 and branches 60, and into the retort through branches 61.

231,190. Cracking Hydrocarbon Oils. M. Melamid, 36, Riemeisterstrasse, Zehlendorf, Berlin. International Convention date, March 22, 1924.

Mineral or tar oils, crude oils or tars are cracked at a lower temperature than usual (300°–400° C.) by atomising the oil or tar with a gas containing hydrogen in the presence of a liquid catalyst. Only the lower boiling constituents of the oil or tar are converted.

Latest Notifications.

234,072. Process for separating potassium and sodium hydroxides. Soc. of Chemical Industry in Basle. May 15, 1924.

234,074. Process of extracting magnesium from alloys or mixtures containing magnesium. Rhodin, B. E. F. May 13, 1924.

234,086. Manufacture of condensation products of the anthraquinone series. Soc. of Chemical Industry in Basle. May 13, 1924.

234,122. Process for the preparation of phosphoric acid free from arsenic. Merck, E. (Firm of). May 14, 1924.

234,138. Process for the preparation of hypophosphites by the simultaneous production of phosphites and phosphoric acids. Merck, E. (Firm of). May 17, 1924.

Specifications Accepted with Date of Application

213,889. Vat dyes, Process for manufacturing. H. Pereira. April 7, 1923.

214,657. Zinc, Recovery of—by electrolysis. Electrolytic Zinc Co. of Australasia, Ltd. April 21, 1923.

215,011. Amorphous silicic acid, Manufacture of. Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.) April 26, 1923.

217,568. Aluminium oxide, Production of. Höganäs-Billesholms Aktiebolag. June 15, 1923.

218,255. Vat dyestuffs of the dibenzanthrone series, Manufacture of. Farbwerke vorm. Meister, Lucius and Brüning. June 25, 1923.

219,673. Dyestuffs, Manufacture of. Farbwerke vorm. Meister, Lucius and Brüning. July 23, 1923.

220,603. High refractories, Process for manufacturing. Refractories Process Corporation. August 14, 1923.

220,604. Metallurgical furnace roof. Refractories Process Corporation. August 14, 1923.

223,543. Synthetic manufacture of hydrocarbons by the electrical method, Industrial process and apparatus for. Petrole Synthetique. October 19, 1923.

233,395. Cracking and/or hydrogenation of liquid hydrocarbons. G. W. Wallace. February 1, 1924.

233,400. Gases, Apparatus for use in the purification of. T. A. Clapham and R. J. W. Clare. February 4, 1924.

233,419. Distillation or evaporation of liquids. J. L. Major and B. Taylor. February 7, 1924.

233,426. Lakes of the basic dyestuffs, Manufacture of. Colloisil Colour Co., Ltd. (*W. Eberlein.*) February 7, 1924.

233,430. Bituminous emulsions. H. A. Mackay. February 8, 1924.

233,452. Vat dyestuffs, Manufacture of. S. Sokal. (*Kalle and Co., Akt. Ges.*) February 16, 1924.

233,470. Thorium, or bodies coated with thorium or with an alloy or mixture thereof. A. S. Cachemaille. (*Westinghouse Lamp Co.*) February 27, 1924.

233,490. Absorption of gases by liquids or solutions, or suspensions of solids in liquids, Means for effecting. H. D. Golding, J. W Pritchard, and United Alkali Co., Ltd. March 21, 1924.

233,508. Operating vertical retorts for carbonising fuel. Woodall-Duckham (1920), Ltd., and A. M. Duckham. April 25, 1924.

Applications for Patents

Auld, S. J. M. Treatment of liquid hydrocarbons. 13,326. May 21.

Bacon, J. Manufacture of china, etc., clays. 13,111. May 20.

Badische Anilin- and Soda-Fabrik and Johnson, J. Y. Manufacture of stable ammonium bicarbonate. 13,328. May 21.

Calvert, J. Treatment of fats, etc. 13,014. May 19.

Casale, L. Production of urea. 13,105. May 19. (Italy, December 23, 1924.)

Case, G. O. Porous compounds, etc., formed from gypsum. 13,094. May 19.

Chemische Fabrik auf Actien vorm. E. Schering. Manufacture of amino-metal-mercapto compounds, etc. 13,465. May 22. (Germany, June 2, 1924.)

Cox, K., and McDermott, P. J. Purification of benzol, etc. 13,450, 13,451. May 22.

Deutsche Gasglühlicht Auerges. Manufacture of titanic acid. 13,524. May 23. (Germany, May 24, 1924.)

Drummond, A. A. Manufacture of condensation products of naphthalene with aldehydic compounds. 13,109. May 20.

Dunstan, A. E. Treatment of liquid hydrocarbons. 13,326. May 21.

Garvey, H. P., and Varcoe, R. G. Apparatus for comminuting, etc., china clay. 12,908. May 18.

Ges. für Wärmetechnik and Ufer, A. Purification of petroleum, etc. 13,364. May 21.

Harris, H. Removal of arsenic from tin and/or antimony, etc. 13,248. May 20.

Heyl, G. E. Cracking oils. 13,317. May 21.

Heyl, G. E. Distillation of oil shale, coal, etc. 13,418. May 22.

Merck, E. (Firm of). Preparation of hypophosphites. 12,966. May 18. (Germany, May 17, 1924.)

Metal Traders Technical, Ltd., and Metallbank und Metallurgische Ges. Production of sulphuric acid. 13,300. May 21.

Naef et Cie, M. Preparation of carbocyclic ketones. 12,959. May 18. (Switzerland, June 16, 1924.)

Ott, Adolph Maximilian, Baron de, and Ruzicka, C. Manufacture of celluloid, artificial silk, etc. 13,341. May 21.

Phillips, A. J., and Shoesmith, H. Receptacles for dyes, etc. 13,495. May 23.

Pirbright Co., Ltd., and Swan, W. Preparation of lanoline from crude wool fat. 13,539. May 23.

Pirbright Co., Ltd. Recovering fats from waste waters, and means therefor. 13,540. May 23.

Rutgerswerke Akt.-Ges. Manufacture of aluminium fluoride. 13,078. May 19. (Germany, May 26, 1924.)

Techno-Chemical Laboratories, Ltd., and Testrup, N. Treatment of peat. 13,221. May 20.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

May 29, 1925.

TRADE, generally speaking, this week has been quiet, with a few bright spots here and there. Prices on the whole remain steady. Stocks continue small, there being little anxiety to replenish these in the present state of trade. Export demand, if anything, is a shade brighter, with no outstanding feature to report.

General Chemicals

ACETONE continues steady at £76 per ton, with practically no stock available.

ACID ACETIC is unchanged at £39 per ton for 80% Technical and £40 per ton for 80% Pure; demand is slow.

ACID CITRIC continues inactive at the price of 1s. 5d. per lb.

ACID FORMIC is in moderate demand and price is comparatively steady at £49 per ton.

ACID LACTIC is a bright spot and good business has been done at £43 per ton for 50% by weight. This article has a rising tendency.

ACID OXALIC.—The demand continues small, but the manufacturers' price of 3¾d. per lb. is maintained.

ACID TARTARIC continues inactive at 11½d. per lb.

ALUMINA SULPHATE continues quiet, with competition fierce, and it is difficult to see how the present figure can decline much farther.

ARSENIC.—There are a few export inquiries in the market, and the quotation is nominally £25 per ton.

BARIUM CHLORIDE continues in active request although the price has declined slightly to £10 per ton; the forward outlook is uncertain.

CREAM OF TARTAR is also active, and good business has been done at the present low price of £75 to £77 per ton.

EPSOM SALTS unchanged, with a good volume of business reported.

FORMALDEHYDE continues idle, but small business is reported at round about £40 per ton.

LEAD ACETATE has not been quite so active, but the price is firmer in sympathy with the metal. White is quoted at £44 10s. per ton, with Brown at £42 10s. per ton.

LIME ACETATE.—Some small business has been transacted at the reduced rate, which stands to-day at £14 5s. per ton for Grey on 80% basis, with Brown nominally quoted at £11 per ton.

METHYL ALCOHOL is lifeless, but on the other hand there are practically no stocks; the nominal quotation is £44 per ton c.i.f. English ports.

POTASSIUM CHLORATE continues extremely scarce, with a strong demand from the Far East; price is firm at 4¼d. to 4½d. per lb.

POTASSIUM PRUSSIATE is active and the price well maintained at 7½d. per lb.

SODIUM ACETATE continues extremely quiet at about £21 per ton.

SODIUM BICHROMATE.—Price unchanged, and considering the present state of trade demand is fairly good.

SODIUM HYPOSULPHITE continues extremely quiet, but price is unchanged.

SODIUM PRUSSIATE is in much better demand, and is firm at 4¼d. per lb.

SODIUM NITRITE has been fairly active, and price is firm at £22 10s. to £23 per ton.

SODIUM SULPHIDE.—Price is maintained, but there is little business of interest to report.

ZINC SULPHATE is fairly active at £13 per ton.

Coal Tar Products

The market generally in coal tar products is fairly quiet, and although supplies are somewhat restricted, consequent on the restriction of output of crude tar from the coke ovens, the limited supplies available are ample to cover current requirements.

90% BENZOL is steady at 1s. 8d. to 1s. 9d. per gallon on rails.

PURE BENZOL is quoted at 1s. 10d. to 1s. 11d. per gallon on rails.

CREOSOTE OIL is firm at 5¾d. to 6d. per gallon on rails in the North, and 7d. to 7¼d. per gallon in London.

CRESYLIC ACID is dull, and is quoted at 1s. 8d. to 1s. 9d. per gallon on rails in bulk, for the Pale quality, 97/99%, while the Dark quality, 95/97%, is quoted at 1s. 6½d. to 1s. 7d. per gallon on rails.

SOLVENT NAPHTHA is steady, at 1s. 3½d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. 1d. to 1s. 2d. per gallon on rails.

NAPHTHALENES are in poor demand, and the lower grades are quoted at £3 5s. to £3 15s. per ton, while 74/76° quality is quoted at £5 to £5 10s. per ton, and 76/78° quality at £6 to £6 10s. per ton.

PITCH.—The season is practically at an end, and very little business is being transacted. Values are more or less nominal at 40s. to 42s. 6d. per ton f.o.b. main U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL firm and 5s. to 10s. higher. Spot, £45 10s.; May, £44 7s. 6d.; June, £44 10s.; June-August and September-December, £44 15s. RAPE OIL quiet. Crude crushed, spot, £50; technical refined, £53. COTTON OIL steady. Refined common edible, £47; Egyptian crude, £42; deodorised, £49. TURPENTINE quiet and occasionally 6d. per cwt. down. American, spot, 73s. 6d.; June, 72s. 6d.; and July-December, 72s.

HULL.—LINSEED OIL.—Naked, spot to June-August, £44 10s.; September-December, £44 7s. 6d. COTTON OIL.—naked Bombay crude, £38 10s.; Egyptian crude, £42; edible refined, £45 10s.; deodorised, £47 10s.; technical, £42. PALM KERNAL OIL.—Crushed naked, £42. GROUNDNUT OIL, crushed-extracted, £48; deodorised, £52. SOYA OIL, extracted and crushed, £41; deodorised, £48. RAPE OIL, extracted, £49 per ton net, cash terms, ex mill. CASTOR OIL and COD OIL unaltered.

Nitrogen Products Market

Export.—During the week the demand has been very quiet and very small sales were made for prompt shipment. Producers continue quoting £11 15s. per ton f.o.b. British port in single bags for June/July shipment, basis 20·6 per cent. nitrogen; 12s. 6d. extra is being charged for double bags.

Home.—The home demand has fallen off as usual during second half May and producers are now disposing of less than 100 tons daily. Home prices for June will not be announced until after Whitsuntide. A big drop is anticipated.

Nitrate of Soda.—The nitrate market continues firm; cargoes have changed hands at £11 15s. and £11 18s. c.i.f. chief European ports. During May there have been large purchases of nitrate for consumption. As a consequence the stock to be carried over will be smaller than anticipated. It is generally expected that the price scale for next year will be similar to the present one.

American Market Movements

(From *Drug and Chemical Markets.*)

INDUSTRIAL chemicals maintain a steady position although buying is slight. Sodium sulphide firm. Ammonium chloride weak. Formic acid easy.

Fine chemicals continue dormant for the most part, being limited to purchases for immediate needs. Menthol and camphor are firmer, alcohols weak and medicinals quiet.

Light oil distillates unchanged. Benzene and toluene easy. Solvent naphtha steady. Intermediates continue in a dull state with prices fairly steady. Pyridine higher. Vegetable oils show only slight improvement. Linseed oil advanced. Chinawood oil unchanged. Animal oils continue easy. Neatsfoot oil in fair demand.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 to £23 per ton.
Acid Boric, Commercial.—Prices reduced by £5 per ton. Crystal, £40 per ton, Powder, £42 per ton.
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.
Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £10 10s. d/d; Contract, £10 d/d. 4 ton lots.
Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.
Copper Sulphate.—£25 to £25 10s. per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d. Normal business.
Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5d. per lb.
Potassium Chlorate.—2¾d. to 3d. per lb.
Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.
Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.
Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength: 20s. less for contracts.
Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£24 per ton.
Sodium Bicarbonate.—£10 10s. per ton, carr. paid.
Sodium Bichromate.—4d. per lb.
Sodium Bisulphite Powder 60/62%.—£16 to £17 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
Sodium Chlorate.—2¾d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.
Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.
Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.
Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—5d. per lb. Quiet demand. Crude 60's 1s. 5d. to 1s. 6d. per gall. Demand negligible.
Acid Cresylic 97/99.—1s. 8d. to 2s. per gall. Fair business. Pale, 95%, 1s. 6d. to 1s. 10d. per gall. Dark, 1s. 6d. to 1s. 9d. per gall. Little demand.
Anthracene Paste 40%.—3d. to 4d. per unit per cwt.—Nominal price. No business.
Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.
Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons.
Toluol.—90%, 1s. 7d. to 1s. 8d. per gall. More inquiry. Pure, 1s. 10d. to 2s. per gall. Steady demand.
Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8d. to 8½d. per gall. Little demand. Middle Oil, Heavy, Standard specification, 5½d. to 6½d. per gall., according to quality and district. Market steady.
Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 4d. to 1s. 6d. per gall. Demand good. Solvent 90/190, 11½d. to 1s. 1d. per gall. Steady business.
Naphthalene Crude.—Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand falling off. Whizzed or hot pressed. £6 to £9 per ton.
Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts. Very quiet.
Pitch.—Medium soft, 35s. to 40s. per ton, according to district. No export business until next season.
Pyridine.—90/160, 19s. to 19s. 6d. per gall. Market more active. Fair demand. Heavy, 11s. 6d. to 12s. per gall. More inquiry.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid H.—3s. 9d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.
Acid Salicylic, technical.—11d. to 11¼d. per lb. Steady demand.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—10d. per lb. d/d.
Aniline Oil.—7½d. per lb. naked at works.
Aniline Salts.—8d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—3s. 8d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 29/31° C.—3d. per lb. Demand quiet.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. per lb.
Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.
p-Dichlorbenzol.—£85 per ton.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 2d. per lb. 100% basis d/d.
Monochlorbenzol.—£63 per ton.
a-Naphthol.—2s. 3d. per lb. d/d.
B-Naphthol.—1s. per lb. d/d.
a-Naphthylamine.—1s. 3½d. per lb. d/d.
B-Naphthylamine.—3s. 9d. per lb. d/d.
m-Nitraniline.—4s. 2d. per lb. d/d.
p-Nitraniline.—2s. 2d. per lb. d/d.
Nitrobenzene.—5½d. per lb. naked at works.
o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.
Nitronapthalene.—10d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. per lb. d/d.
p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
o-Toluidine.—10d. per lb.
p-Toluidine.—2s. 3d. per lb. naked at works.
m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Market quiet in sympathy with general commercial depression.

Acetate of Lime.—Brown £9 10s. to £10. Quiet market. Grey, £15 per ton. Liquor, 9d. per gall. 32° Tw.
Acetone.—£73 per ton.
Charcoal.—£7 5s. to £8 10s. per ton, according to grade and locality. Fair demand.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 9d. per gall. Unrefined.
Wood Naphtha, Miscible.—4s. 3d. per gall. Only moderate market. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P.
Wood Tar.—£4 per ton. Demand slack.
Brown Sugar of Lead.—£43 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.
Arsenic Sulphide, Yellow.—2s. per lb.
Cadmium Sulphide.—4s. 4d. per lb., according to quantity.
Carbon Bisulphide.—£32 to £35 per ton, according to quantity.
Carbon Black.—6d. to 6½d. per lb., ex wharf.
Carbon Tetrachloride.—£62 to £67 per ton, according to quantity, drums extra.
Chromium Oxide, Green.—1s. 4d. per lb.
Indiarubber Substitutes, White and Dark.—5¾d. to 7½d. per lb.
Lamp Black.—£48 per ton, barrels free.
Lead Hyposulphite.—9d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£16 to £18 per ton f.o.r. London.
Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£56 to £65 per ton.

Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 6d. per lb. Dearer.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£41 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 8d. to 2s. 9d. per lb., according to quantity. Ample supplies and keen competition.
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.
Acid, Boric B.P.—Prices reduced by £5 per ton. Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 5d. per lb., less 5% for ton lots. Slightly upward tendency.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.
Acid, Pyrogallic, Crystals.—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots, according to quantity. Steady market.
Acid, Salicylic.—1s. 3d. to 1s. 6d. per lb., according to quantity. Supplies exceed demand.
Acid, Tannic B.P.—2s. 9d. per lb. Quiet steady demand.
Acid, Tartaric.—1s. 1d. per lb., less 5%. Very firm. Demand good.
Amidol.—9s. per lb., d/d.
Acetanilide.—1s. 7d. per lb. for quantities.
Amidopyrin.—13s. 9d. per lb.
Ammonium Benzoate.—3s. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—11s. 6d. per lb. Price lower owing to competition.
Benzonaphthol.—3s. 6d. per lb. spot. Weaker.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. to 11s. per lb.
Bismuth Subnitrate.—8s. 8d. to 10s. 8d. per lb. according to quantity.
} The price of Bismuth Metal has been raised from 5s. to 7s. 6d. per lb. Bismuth Salts have been advanced accordingly.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 2s. 1d. to 2s. 3d. per lb.; sodium, 2s. 2d. to 2s. 4d. per lb.; ammonium, 2s. 6d. to 2s. 8d. per lb., all spot. Market very firm. Prices again advanced.
Calcium Lactate.—1s. 6½d. to 1s. 8d., according to quantity. Fair demand and steady market.
Chloral Hydrate.—3s. 8d. per lb., duty paid.
Chloroform.—2s. 6d. per lb. for cwt. lots.
Creosote Carbonate.—6s. 9d. per lb. Little demand.
Formaldehyde.—£39 10s. per ton, in barrels ex wharf.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
Guaiacol Carbonate.—7s. 6d. per lb.
Hexamine.—2s. 4d. per lb. for cwt. lots.
Homatropine Hydrobromide.—25s. to 30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.
Hydroquinone.—4s. 3d. per lb. Nominal.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 11d. to 2s. 3d. per lb.
Magnesium Carbonate.—Light Commercial, reduced to £34 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £24 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 44s. per lb.; April delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make. Market rather easier.
Mercurials.—Market flat. Mercury slightly firmer. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.
Methyl Salicylate.—1s. 6d. to 1s. 8d. per lb., for ton lots.
Methyl Sulphonal.—18s. 6d. per lb. Cheaper.
Metol.—11s. per lb. British make.
Morphone and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 2d. for B.P. quality. Keen competition has brought prices down.
Paraldehyde.—1s. 2d. to 1s. 4½d. per lb., in free bottles and cases.
Phenacetin.—4s. 5d. per lb. in cwt. lots. Unsettled. Supplies exceed demand.
Phenazone.—6s. 3d. to 6s. 6d. per lb. Spot price lower than forward.
Phenolphthalein.—4s. 3d. to 4s. 6d. per lb. for cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—83s. per cwt., less 2½% for ton lots.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot; commercial, 8d. to 8¼d. per lb., carriage paid. Slight reaction after recent advance.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—4s. 6d. per lb. In fair quantities.
Saccharin.—63s. per lb. in 50 lb. lots.
Salol.—3s. 6d. per lb., for cwt. lots. Slightly dearer.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb. From natural benzoic acid. Supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.
Sodium Salicylate.—Powder, 2s. 2d. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 4d. per lb. Flake, 2s. 3d. to 2s. 6d. per lb. Strong demand, market firm.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1-cwt. kegs included.
Sulphonal.—13s. per lb. accepted for quantity.
Thymol.—16s. per lb.

Perfumery Chemicals

Acetophenone.—9s. 6d. per lb.
Aubepine.—11s. 3d. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 1½d. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 7½d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 7½d. per lb.
Benzaldehyde free from Chlorine.—3s. per lb.
Benzyl Benzoate.—3s. per lb.
Cinnamic Aldehyde Natural.—14s. 9d. per lb.
Coumarin.—14s. 9d. per lb.
Citronellol.—22s. per lb.
Citral.—9s. per lb.
Ethyl Cinnamate.—10s. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—10s. per lb.
Geraniol (Palmarosa).—28s. 6d. per lb.
Geraniol.—9s. 6d. to 18s. 6d. per lb.
Heliotropine.—6s. 3d. per lb.
Iso Eugenol.—15s. per lb.
Linalol ex Bois de Rose.—24s. 6d. per lb.
Linalyl Acetate.—24s. 6d. per lb.
Methyl Anthranilate.—10s. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb.
Musk Ketone.—37s. 6d. per lb.
Musk Xylol.—10s. 3d. per lb.
Nerolin.—4s. 6d. per lb.
Phenyl Ethyl Acetate.—15s. per lb.
Phenyl Ethyl Alcohol.—14s. per lb.
Rhodinol.—38s. 6d. per lb.
Safrol.—1s. 8d. per lb.
Terpineol.—1s. 10d. per lb.
Vanillin.—25s. to 25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—13s. 3d. per lb. Cheaper.
Anise Oil.—2s. 7½d. per lb.
Bergamot Oil.—16s. per lb.
Bourbon Geranium Oil.—20s. per lb. Cheaper.
Camphor Oil.—60s. per cwt.
Cananga Oil, Java.—10s. 9d. per lb.
Cinnamon Oil, Leaf.—6d. per oz.
Cassia Oil, 80/85%.—9s. 3d. per lb.
Citronella Oil.—Java, 85/90%, 4s. 9d. per lb. Ceylon, 3s. to 3s. 2d. per lb., according to quality. Firmer with higher prices for forward delivery.
Clove Oil.—7s. 6d. per lb.
Eucalyptus Oil, 70/75%.—2s. per lb.
Lavender Oil.—French 38/40% Esters, 31s. 6d. per lb. Cheaper.
Lemon Oil.—3s. 6d. per lb. Advanced.
Lemongrass Oil.—5s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.
Palma Rose Oil.—15s. 3d. per lb.
Otto of Rose Oil.—Bulgarian, 42s. 6d. per oz. Anatolian, 28s. per oz.
Palma Rosa Oil.—16s. 9d. per lb.
Peppermint Oil.—Wayne County, 60s. per lb. Cheaper. Japanese, 15s. 9d. per lb. Cheaper.
Petitgrain Oil.—9s. 9d. per lb.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, May 29, 1925.

THE slight improvement in the heavy chemical market reported last week has been fairly well maintained, there being good inquiry both for home and export. There is no notable change in prices.

Industrial Chemicals

ACID ACETIC.—In moderate demand, and prices unchanged. 98/100% glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports; 80% pure, £40 to £42 per ton; 80% technical, £39 to £41 per ton, packed in casks c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated or small flaked, £40 per ton. Powdered, £42 per ton, packed in bags, carriage paid, U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Still further reduced. Now quoted 4½d. per lb. delivered.

ACID CITRIC, B.P. CRYSTALS.—Quoted 1s. 4½d. per lb. less 5%, ex store. Offered for early shipment at a fraction less.

ACID FORMIC, 85%.—Spot material now quoted £49 5s. per ton, ex store. Offered for prompt shipment from the continent at £48 per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—Usual steady demand, quoted £23 15s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Rather lower at about 3⅞d. per lb., ex wharf. Offered for prompt delivery at about 3¾d. per lb., c.i.f. U.K. port.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 1s. per lb. less 5%, ex store. Offered for prompt shipment from the continent at 11¾d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Quoted £6 15s. per ton, ex store, spot delivery. Offered for prompt shipment from the continent at about £6 5s. per ton, c.i.f. U.K. ports.

ALUM, LUMP POTASH.—Offered from the continent at about £8 per ton, c.i.f. U.K. ports. Spot material quoted £9 5s. per ton, ex store. Ground quality quoted £7 15s. per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—Unchanged at 1s. 4½d. per lb., ex station, containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks delivered U.K. ports.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantities.

AMMONIA MURIATE.—Grey galvaniser's crystals of English manufacture now quoted £28 10s. per ton, ex station. Offered from the continent at about £25 per ton, c.i.f. U.K. ports. Fine white crystals quoted £20 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Spot material unchanged at about £26 per ton, ex store. Offered for early delivery at £25 per ton, ex wharf.

BARIUM CARBONATE.—98/100% offered from the continent at about £8 per ton, c.i.f. U.K. ports.

BARIUM CHLORIDE, 98/100% CRYSTALS.—English material quoted £10 5s. per ton, ex store, in little demand. Foreign on offer at £8 10s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station; contracts, 20s. per ton less.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English manufacturers' price unchanged, £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental rather higher at about £3 17s. 6d. per ton c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks free.

COPPER SULPHATE.—English material for export unchanged at about £24 10s. per ton, f.o.b. U.K. ports. Continental available at about £23 per ton, ex wharf, near delivery.

FORMALDEHYDE, 40%.—Spot material unchanged at about £40 per ton, ex store. Offered for early shipment at £39 per ton, c.i.f. U.K. ports.

GLAUBER SALTS.—White crystals of English manufacture, unchanged at £4 per ton, ex store or station. Continental on offer at about £3 5s. per ton, c.i.f. U.K. ports.

LEAD, RED.—Spot material of continental manufacture quoted £42 10s. per ton, ex store. Offered from the continent at about £40 per ton, c.i.f. U.K. ports.

LEAD, WHITE.—Unchanged at about £43 10s. per ton, ex store.

LEAD ACETATE.—Spot material now on offer at £44 10s. per ton, ex store. Quoted £43 15s. per ton, c.i.f. U.K. ports. Prompt shipment from the continent.

LEAD NITRATE.—In moderate demand. Quoted £42 per ton, ex store or station.

MAGNESITE, GROUND CALCINED.—Usual steady demand and price unchanged at about £8 per ton, ex station.

MAGNESIUM CHLORIDE.—Unchanged at about £2 17s. 6d. per ton, c.i.f. U.K. ports. Prompt shipment.

POTASH CAUSTIC, 88/92%.—Unchanged at about £29 per ton, ex wharf, prompt shipment from the continent. Spot material available at about £30 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Price for home consumption 5d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Rather higher quotations from the continent. Now quoted £25 10s. per ton, c.i.f. U.K. ports. Spot material available at very little more. 80/85% hydrated quality quoted £22 per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE.—Still scarce. Spot material quoted 4d. per lb., ex store. Limited quantity available for prompt shipment from the continent at about 3¾d. per lb., c.i.f. U.K. ports.

POTASSIUM NITRATE, SALTPETRE.—Refined granulated, 99% quoted at about £28 per ton, ex store. Quoted £24 10s. per ton, c.i.f. U.K. ports for prompt shipment from the continent.

POTASSIUM PERMANGANATE, B.P. CYRSTALS.—On offer at 7¼d. per lb., ex store. Offered for prompt shipment from the continent at about 7¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Spot material still quoted 7¼d. per lb., ex store. Offered for prompt shipment from the continent at about 7d. per lb., ex wharf.

SODA CAUSTIC.—76/77%, £18 per ton. 70/72%, £16 12s. 6d. per ton. Broken 60%, £17 2s. 6d. per ton. Powdered 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material quoted £21 per ton, ex store. Offered for prompt shipment from the continent at about £19 per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Rather higher quotations from the continent now quoted £8 15s. per ton, c.i.f. U.K. ports. English material unchanged at £9 15s. per ton, ex station. Pea crystals, £14 per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 7s. 6d. per ton, ex store. 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Offered from the continent at about £22 per ton, c.i.f. U.K. ports. Spot material quoted £24 10s. per ton, ex store.

SODIUM PRUSSIATE, YELLOW.—In moderate demand and price unchanged at about 4d. per lb., ex store.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English manufacturers quote: 60/62% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more; crystal, 31/34%, £9 5s. per ton, carriage paid U.K. stations, minimum four ton lots, with slight reduction for contracts over a period; 60/62% solid, offered from the continent at about £10 15s. per ton, c.i.f. U.K. ports; broken, £1 per ton more; 30/32% crystals, £8 5s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton—ex store, prices nominal.

ZINC CHLORIDE.—97/98% of continental manufacture quoted £23 per ton, c.i.f. U.K. ports. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Commercial crystals on offer from the continent at about £12 per ton, c.i.f. U.K. ports.

NOTE.—The above prices are for bulk parcels and are not to be taken as applicable to small parcels.

The Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, May 29, 1925.

Conditions on the Manchester chemical market remain pretty much as they have been for some time. Business is anything but brisk, and what is being put through is mainly for small parcels and for spot or near delivery. In some sections of the cotton textile industry, which normally accounts for a large slice of the home demand for chemicals, a rather better tone has been reported during the week, and there is a proposal afoot to reduce the extent of short-time working in the American section. The demand for export, especially to the Continent, continues very moderate.

Heavy Chemicals

There is a quietly steady demand for soda crystals, and quotations are well held at £5 5s. per ton. Prussiate of soda is selling only in moderate quantities, but values are not greatly changed from recent levels, about 3⅞d. per lb. now being asked. Phosphate of soda is rather a quiet section at £12 10s. to £12 15s. per ton. The demand for caustic soda is maintained and values are firm at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76–77 per cent. Sodium sulphide is not attracting much attention from buyers, and prices are easy at £13 15s. per ton for 60–65 per cent. concentrated solid and £9 10s. per ton for crystals. Saltcake is quiet at £3 15s. to £4 per ton, with glauber salts in limited request at about £3 10s. Acetate of soda is rather dull, but prices keep fairly steady at £19 to £20 per ton. Alkali is firm and meets with a moderate amount of inquiry at £6 15s. per ton. Bichromate of soda is steady and in fair demand at round 4d. per lb. Hyposulphite of soda is quiet but unchanged at £13 10s. per ton for photographic crystals, and £9 5s. per ton for commercial quality. Bicarbonate of soda is steady at round £10 10s. per ton. Bleaching powder is only moderately active, but values are well held at £9 10s. per ton. Chlorate of soda is steady and in fair request at about 3d. per lb.

In potash compounds there are few price changes to report since last week. Both caustic potash and carbonate are rather quiet, but values are steady; caustic is currently quoted at about £30 per ton and carbonate at £24 10s. to £25. Bichromate of potash keeps firm and meets with a moderate inquiry at about 5d. per lb. Yellow prussiate of potash is in small demand at round 7d. per lb. Chlorate of potash is firm and in fair request at 3½d. to 3¾d. per lb. Permanganate of potash is not attracting much attention, though commercial quality continues to be offered at 6d. and pharmaceutical at round 7½d.

The market for arsenic keeps very dull and inactive, and values are weak in consequence, white powdered, Cornish makes, now being quoted in Manchester at £26 to £27 per ton. Sulphate of copper is selling slowly at about £24 10s. per ton. The demand for commercial Epsom salts is restricted, but prices are unchanged at £4 5s. per ton, with magnesium sulphate, B.P. quality, on offer at round £6. Acetate of lime is quoted at £14 10s. to £15 per ton for grey material and £9 for brown, with business slow. Acetate of lead is quiet, but steady at £45 per ton for white and £40 to £41 for brown. Nitrate of lead is still offering at round £41.

Acids and Coal-Tar Products

Acetic acid is only in moderate demand at £39 to £40 per ton for 80 per cent. commercial quality and about £67 for glacial. Citric acid is selling in fair quantities and values are firm at 1s. 4½d. per lb. Tartaric acid is steady at 1s. to 1s. 0½d. per lb. Oxalic acid is quiet at 3¾d. per lb.

Among coal-tar products, actual business in pitch has been on a small scale; current quotations are round 41s. per ton. Carbolic acid is still neglected and values are weak and nominal; crystals are on offer at 4½d. per lb., and crude material at 1s. 6d. per gallon. Naphthalene is quiet and easy at about £14 10s. per ton for refined qualities and £4 5s. and upwards for crude. Creosote oil is offering at about 6d. and solvent naphtha at 1s. 5½d. per gallon.

Alleged Water Pollution

At the Chancery Court in Manchester, on Wednesday, the trial was begun of an action brought by Thomas Murdoch, bleacher and finisher, of the Medlock Vale Bleachworks, near Clayton Bridge, against the Clayton Aniline Company, Ltd., colour manufacturers at Clayton.

The plaintiff complained that the defendants had deposited on their land chemical dye and other refuse from which water drained into the Lumb Brook from which his works derived their supply of water, and caused it to be so polluted that damage was done to the cloth passing through various processes in the works. He asked the Court to grant an injunction restraining the defendants from continuing to do this, and also (if necessary) to make a mandatory order upon the defendants to remove the material already deposited.

Mr. Atkinson, for the plaintiff, stated that for many years the works had enjoyed an adequate supply of good water. Then the defendants, having acquired a plot of land, which formed a sort of valley, proceeded to fill it up with refuse from their works. Their operations began in 1922, and so far about 10,000 tons had been deposited of what was, in the main, lumps of coloured stuff. Water, sometimes black, sometimes of a claret colour, and containing matter in solution, percolated through the tip and passed into the stream from which the plaintiff's works drew water.

The defence put forward was a denial that any damage had been done, or that any polluting matter was escaping from the tip when the action was begun. It was also stated that the defendants had secured another site for a tip on which they would deposit refuse of the type objected to.

Mr. Murdoch, one of three partners, said his attention was called to stains on the cloth, attributed to the water, in May, 1923, and the writ in the action was delivered in the following July. He visited the tip in the spring of 1924 and saw lumps of yellow and red ochre as big as his hat.

Mr. Charles Garnett Lomax, civil engineer, of Manchester, said that beyond the tip he had not been able to find any other source of pollution except the general pollution which one would expect to find in a neighbourhood of this description.

The Court adjourned until Thursday.

New Non-Ferrous British Chemical Standard

We are informed that the first of a series of non-ferrous standard analysed samples has just been issued, having the following analysis:—

White Metal "A" (Lead Base).

Lead	82·58	per cent.
Antimony	12·05	,,
Tin	4·64	,,
Copper	0·34	,,
Iron	0·07	,,
Bismuth	0·03	,,
Arsenic	0·06	,,
Zinc	0·08	,,
	99·85	

The standard has been prepared (by a novel method to ensure homogeneity) to meet the need of chemists who wish to check the methods they use for the analysis of lead-base alloys, such as bearing metal, terne metal, stereotype metal, magnolia metal, hard (antimonial) lead, tea lead, plumbers' solder, stuffing box alloys (metallic packing), "lead wool," etc. The difficulties encountered during standardisation emphasised the need for and value of such a standard.

As usual, the analyses have been undertaken by a number of chemists having special experience in this class of alloy—*e.g.*, referee analysts, manufacturers, users and government departments, including the Research Department, Woolwich, and the Bureau of Standards, U.S.A. The standard is available to anyone at a price based on covering the cost of preparing and issuing it. The three usual sizes of 50g., 100g. and 500g. are provided and a certificate (1st edition) giving the names of the analysts collaborating and their analyses is furnished with each sample. In a later edition an outline of the methods employed will be included and sent on request in exchange for the 1st edition. Further particulars may be obtained from the headquarters, 3, Wilson Street, Middlesbrough.

Company News

BROXBURN OIL COMPANY.—A dividend of 7½ per cent., free of tax, is recommended on the ordinary shares for the past year.

OAKBANK OIL COMPANY.—A final dividend of 3 per cent. is proposed on the preference shares, making 6 per cent. for the past year.

BROKEN HILL PROPRIETARY, BLOCK 14.—Operations for the half-year ended March 31 last resulted in a total working profit of £18,297.

PAN DE AZUCAR NITRATE CO.—The directors have declared an interim dividend of 5 per cent., less tax, in respect of the year ending June 30, 1925.

PUMPHERSTON OIL COMPANY.—The directors recommend a dividend of 10 per cent., free of income-tax, on the ordinary shares for the past year, carrying forward £46,576.

YOUNG'S PARAFFIN COMPANY.—The accounts for the past year show a surplus, after providing for debenture interest, of £10,816, which it is proposed to carry forward.

TARAPACA AND TOCOPILLA NITRATE CO.—The directors announce a dividend of 10 per cent., less tax, in respect of the year ended December 31. For the previous year 12½ per cent. was paid.

ANGLO-AMERICAN OIL CO.—A final dividend is announced of 2s. 6d. per share, free of tax, in the United Kingdom. With the interim dividend this makes a total of 20 per cent. for the year, against 17½ per cent. for the previous year.

A. B. FLEMING AND CO.—The net profit for the year ended April 30 last was £33,549, and £11,142 was brought in. The dividend is unchanged at 15 per cent.; £9,000 is appropriated for new buildings and plant; and £6,000 is added to reserve; leaving £11,691 to be carried forward.

NATIONAL DRUG AND CHEMICAL COMPANY OF CANADA.—The directors report a loss for the year ended January 31 last of £6,858. The surplus of assets over liabilities on January 31 were equal to £1 13s. 7d. for each outstanding first preference share, as compared with £1 11s. on January 31, 1918, and £1 9s. 10d. on January 31, 1915.

BLEACHERS' ASSOCIATION.—The net profits for the past year amounted to £851,697, being a record and comparing with the previous best of £813,579 in 1920. The dividend is maintained at 20 per cent. for the year, the final distribution being 15 per cent. actual, while £150,000 is placed to general reserve, against £125,000 last time, making that fund £1,850,000, which exceeds the amount of the ordinary capital.

BRITISH OIL AND CAKE MILLS, LTD.—A circular has been issued to the shareholders stating that the directors have entered into an arrangement with the directors of Lever Brothers, Ltd., with the object of securing co-operation in business in which they have so many common interests. The arrangement contemplated will involve a change in the status of the existing ordinary shares of the British Oil and Cake Mills. It is proposed to convert the whole of the present ordinary shares into cumulative preferred ordinary shares, carrying a cumulative dividend at the rate of 10 per cent. per annum, subject to income tax, with a right to a further dividend, when profits permit, not exceeding 2½ per cent., so as to secure a dividend to the shareholders of 10 per cent., free of income tax. As an additional security for the payment of this dividend, the British Oil and Cake Mills, Ltd., will become the holders of 1,750,000 fully paid 20 per cent. "A" cumulative preferred ordinary shares of £1 each of Lever Brothers. This will provide an additional revenue of £350,000 per annum, sufficient to cover the 10 per cent. dividend on the preferred ordinary shares, as well as the dividend on the existing 5½ per cent. cumulative preference shares. There will be allotted to Lever Brothers 3,500,000 fully paid ordinary shares in the British Oil and Cake Mills, which shares will rank for dividend out of surplus profits after payment of the above-mentioned dividends on the 5½ per cent. preference and the preferred ordinary shares. As it is proposed that the scheme shall operate as from January 1 last, the necessary resolutions will be submitted to an extraordinary general meeting to be summoned as early as possible in June.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to June 20, 1925.

"CUTOGEN."

457,492. For Oxygen. Liquid Air, Ltd., Queen's Park Works, 111, Salusbury Road, London, N.W.6; manufacturers. March 24, 1925.

"OMNADIN."

457,813. For chemical substances used in manufactures, photography or philosophical research, and anti-corrosives. Class 1. Kalle and Co., Aktiengesellschaft (a company incorporated under the laws of Germany), 23, Rheinstrasse, Biebrich-on-Rhine, Germany; manufacturers and merchants. April 3, 1925. (To be Associated. Sect. 24.)

"CRYSTALUNDUM."

455,297. For raw, or partly prepared, mineral substances used in manufactures, not included in other Classes. Class 4. Société des Forces Motrices de la Vallée d'Aspe (a Joint Stock company organised and existing under the laws of France). 10, rue Vezelay, Paris, France; manufacturers. January 13, 1925.

"INSTILL."

457,266. For raw, or partly prepared, mineral substances used in manufactures, not included in other classes. Class 4. Refiners, Ltd., 3, Parsonage, Manchester; manufacturers. March 17, 1925.

Opposition to the Registration of the following Trade Marks can be lodged up to June 27, 1925:—

"FANAL."

455,687. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives, but not including paints, and not including any goods of a like kind to paints. Badische Anilin and Soda Fabrik (a Joint Stock Company organised under the laws of Germany), Friedenheimerstrasse, Ludwigshafen-on-Rhine, Germany; manufacturers of alizarine, aniline dyes, artificial indigo and chemicals. January 26, 1925.

"KEMOID."

457,923. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class 1. The firm trading as The Holland Avery Chemical Company, Back of 32, Willis Street, Ashted, Birmingham; manufacturing chemists. April 8, 1925.

"WASOF."

458,059. For water-softening preparations. Class 1. J. Lyons and Company, Limited, Cadby Hall, Hammersmith Road, Kensington, London, W.14; purveyors and caterers. April 14, 1925.

Transport Problems

THE annual general meeting of the Mansion House Association on Railway and Canal Traffic was held on Friday, May 22, when the report of the Executive Committee and accounts for the year 1924 were approved and adopted, and Sir Herbert Matthews was unanimously re-elected president.

Questions relating to the general revision of railway rates and charges, brake levers on both sides of private owners' wagons, road transport, the London Traffic Act, and other important matters were discussed, and upon the recommendations of a meeting of the Executive Committee held earlier in the day, it was decided to hold a meeting of representatives of the private wagon owners on June 18 for the purpose of co-ordinating the information required by the Ministry of Transport, and determining further procedure with a view to obtaining an extension of time for fitting brake lever appliances on both sides of wagons. It was also decided to appoint a permanent Standing Committee of the Road Transport Section of the Association for the purpose of considering and dealing with all questions in relation to road transport generally.

CYCLOHEXANOL SOAPS

The attention of British makers of soap, especially soaps used for SCOURING WOOL, YARN, FELT and other TEXTILE FABRICS, and also for LAUNDRY WORK and CHEMICAL CLEANING, etc., etc., cannot too strongly be drawn to the remarkable detergent and cleansing properties of Cyclohexanol Soaps, *i.e.*, soaps in which have been incorporated in certain proportions the highly solvent Alcohols

CYCLOHEXANOL and METHYLCYCLOHEXANOL

Among many advantages to be gained from such combinations the following may be mentioned :

1. **The cleansing power of the soap is practically doubled.**
2. **A high percentage of the quantity of fat required per batch is saved.**
3. **The necessity for long *boiling* of the fabric to be cleansed is avoided, owing to the enormously enhanced cleansing and detergent action in lukewarm water, thus saving customers both time and fuel.**

Enormous quantities of these products are now used by Continental Soap-makers.

CYCLOHEXANOL (SEXTOL)

AND ITS ALLIED SOLVENTS ARE NOW MADE IN THIS COUNTRY BY

HOWARDS & SONS, LTD. (Est. 1797), **ILFORD, LONDON**

WHO WILL FURNISH SAMPLES AND PRICES ON REQUEST.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LEAD, OILS, ETC.—Tenders are invited by Birmingham Corporation for supplies of red and white lead, linseed oil, sheet glass, paint and gas mantles. Tenders, on supplied forms, by June 8.

CHEMICALS, ETC.—Tenders are invited by the Metropolitan Asylums Board for supplies of carbonic acid gas, paraffin, methylated spirits, oils, soap, soda, and window glass. Forms from Office of the Board, Victoria Embankment, E.C.4, to be returned by June 4.

Tariff Changes

NYASALAND.—The import duty has been reduced from 15 per cent. to 10 per cent. *ad valorem* in the case of cement, asbestos sheeting, oil, linseed, turpentine and turpentine substitutes, painters' colours, varnishes and dryers, window glass and putty.

A specific duty of 2d. per gallon has been imposed on motor spirit in lieu of the duty of 15 per cent. *ad valorem*.

UNITED STATES OF AMERICA.—The import duty on potassium chlorate has been increased from 1½ to 2¼ cents per lb. The investigation held by the Tariff Commission established the fact that Germany was the principal competing country.

UNION OF SOUTH AFRICA.—The proposed new preferential rebates to the U.K. and Dominions under the new Tariff are set out at considerable length in the *Board of Trade Journal* for May 21. In the following details the first figure represents the maximum duty and the second the amount of rebate. Polished plate glass, 7d. per sq. ft.—1d. per sq. ft.; plain clear sheet glass, 7s. per 100 sq. ft.—1s. per 100 sq. ft. Dry white lead, 7s. per 100 lb.—1s. per 100 lb. Ground in oil (i) in packages containing 50 lb. or over, 10s. per 100 lb.—1s. per 100 lb.; (ii) less than 50 lb. packages, 11s. per 100 lb.—1s. per 100 lb.

NEWFOUNDLAND.—A new and considerably increased tariff is under consideration.

GERMANY.—A special section dealing with the extensive changes proposed in German import duties is published in the *Board of Trade Journal* for May 28. It may be obtained separately, price 6d.

Testing of Weights, Balances, Etc.

THE National Physical Laboratory, Teddington, has issued a new pamphlet on methods of testing weights, balances, and densities, which came into operation on May 1. Considerable changes have been made in the conditions of test relating to the verification of weights. A wider selection of tests is now offered, and in the case of certain weights increased accuracy of standardisation is given, corresponding in the new "Class A" test to a uniform accuracy of certification of one part in one million in the case of weights of 10 grammes and upwards. New tolerances have also been assessed for weights in both metric and English units. Copies of the pamphlet may be obtained free of charge on application to The Director, The National Physical Laboratory, Teddington, Middlesex.

Unpublished Preparations for "Organic Syntheses"

THE suggestion has been made that *Organic Syntheses*, an annual publication of satisfatory methods for the preparation of organic chemicals, can increase its scope of usefulness by making available directions for preparations which have been submitted for future volumes. The following is a list of some of the preparations which are now being checked by the editors. Those who wish a copy of directions for some of the listed preparations can procure the same by writing to Mr. Henry Gilman, Iowa State College, Ames, Iowa, U.S.A.:—

Acetamidine, acrolein, benzal pinacolone, benzylaniline, *m*-bromobenzyl chloride, *o*-bromotoluene, α-cyano-β-phenylacrylic acid, cyclohexyl-bromopropene, furoic acid, hydroxylamine base, *p*-iododimethylaniline, *p*-iodoguaiacol, mandelic acid, 1-methyl-2-pyridone, myristic acid, naphthaldehyde, phenyl isothiocyanate, sym-phthalyl chloride, propionaldehyde, pyromellitic acid, pyrrol carboxylic acid, thiophosgene, thymoquinone, *o*-toluamide, *m*-tolylene diamine, viscose.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry make no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

GLYNN, David, 58, Blythe Street, Birmingham, drug merchant. (C.C., 30/5/25.) £17 17s. 11d. April 21.

LAMBERT (SAMUEL) AND CO., LTD., 10, Great St. Helens, E.C., drug merchants. (C.C., 30/5/25.) £32 4s. 4d. April 21.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.]*

ANDRADE NITRATE CO., LTD., London, E.C. (M., 30/5/25.) Registered May 13, £15,000 debentures; general charge.

C. R. L., LTD., London, E.C., chemists, etc. (M., 30/5/25.) Registered May 13, £1,500 debenture, to H. J. Randall, Bridgend, solicitor; general charge. *Nil. December 31, 1923.

ELDERS WALKER AND CO., LTD., Gateshead, paint manufacturers. (M., 30/5/25.) Registered May 12, mortgage to bank; charged on land at Sunderland Road, Gateshead, with plant, etc. *£581 11s. 8d. overdraft. April 29, 1924.

RICHARDS (JOHN MORGAN) AND SONS, LTD., London, E.C., patent medicine vendors. (M., 30/5/25.) Registered May 18, £20,000 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act 1908), present issue £15,000; general charge. *Nil. May 16, 1924.

SOCIÉTÉ INDUSTRIELLE DU RADIUM, LTD., London, E.C. (M., 30/5/25.) Registered May 13, deed of modification (supplemental to Trust Deeds dated December 21, 1921, September 8, 1922, and April 26, 1923), securing £4,000 or the equivalent in francs; general charge, except proportion of ore lying above ground at company's South Terras Mine, etc. *£24,680 2s. April 4, 1924.

New Companies Registered

BRITISH ANHYDROUS AMMONIA CO., LTD., Salisbury House, London Wall, London, E.C. Chemical manufacturers and merchants, chemists, druggists, drysalters, oil and colourmen, etc. Nominal capital, £1,000 in £1 shares.

F. McNEILL AND CO., 14–24, Lamb's Passage, Bunhill Row, London, E.C.1. Chemists, druggists, drysalters, manufacturers of and dealers in chemical, industrial and other compounds. Nominal capital, £200,000 of £1 shares (125,000 7½ per cent. cumulative preference and 75,000 ordinary).

MELDRUM TIMPERLEY AND CO., LTD., chemists, drysalters, druggists, chemical manufacturers, importers, exporters, refiners, etc. Nominal capital, £1,200 in £1 shares (600 8 per cent. cumulative participating preference and 600 ordinary). Solicitors: T. Smith, 71, Princess Street, Manchester.

GEORGE SANDFORD, LTD. Manufacturers of and dealers in silk, cotton, etc.; dye manufacturers, merchant chemists; importers of and dealers in chemicals of all kinds, etc. Nominal capital, £2,000 in £1 shares.